

City of Portland Bureau of Transportation –
Signals, Street Lighting & ITS Division

Street Lighting Design Guide

Version 1

April 2023



Street Lighting Design Guide

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1 INTRODUCTION

The material contained in the *Street Lighting Design Guide* is for informational purposes to aid new designers and those unfamiliar with the City of Portland Bureau of Transportation (PBOT) practices regarding City of Portland street lighting design. It also provides guidance on plan presentation and content to maintain consistency in design. The intended user of this document is the consultant design engineer (referred to as the “designer” in this document), or the PBOT Street Lighting Engineer responsible for reviewing design plans (referred to as the “reviewer” or “SSL District Engineer” in this document).

This lighting design guide is to be used as a guidance document and is not a standard. As such, much of the information contained and referenced herein is PBOT’s best practice based on guidance and standards contained in the following:

- PedPDX Appendix K: *PBOT Lighting Level Guidelines*
- Illumination Engineering Society of North America’s *Recommended Practice for Design and Maintenance of Roadway and Parking Facility Lighting* (RP-8-21)
- *National Electrical Code* (NEC)
- *National Electric Safety Code* (NESC)
- *City of Portland Standard Construction Specifications*
- *City of Portland Standard Drawings and Details*

1.1 PBOT SIGNALS, STREET LIGHTING AND ITS DIVISION

PBOT Traffic Signals, Street Lighting & ITS Division (SSL) is responsible for developing and maintaining standards, specifications, and best practices relating to the City’s traffic signal, street lighting, and intelligent transportation systems. Additionally, the Division is responsible for maintaining the City’s existing infrastructure, overseeing the construction of new infrastructure, and serving as a review body for development-driven construction activities (permit projects).

1.2 UPDATES

Street lighting technology is constantly changing. This change is due to the rapid acceptance of new technologies, their application, and new research. The rapid change in LED technology, especially in improved efficacy, now allows for lower color temperatures to be used to light roadways and meet standards.

This manual provides the current best practices in use by PBOT for design of City owned lighting systems at the time of the writing of this publication. Information contained within this manual may periodically become outdated. It is therefore important to contact the PBOT SSL District Engineer early in the design process to ensure that the design considers the most up-to-date practices in use by the City.

1.3 SPECIFICATIONS, STANDARDS AND APPROVED MATERIALS

The current versions of the City of Portland *Standard Construction Specifications*, *Special Provisions*, *Standard Drawings*, and *Electrical Equipment and Materials List* supersedes information contained in this document. The information can be found online at the following web links:

1.3.1 *Standard Construction Specifications*

<https://www.portland.gov/transportation/engineering/construction-specifications>

1.3.2 *Special Provisions*

<https://www.portland.gov/transportation/engineering/construction-specifications#toc-pbot-special-provisions->

1.3.3 *Standard Drawings & Details*

<https://www.portland.gov/transportation/engineering/standard-drawings>

1.3.4 *Electrical Equipment and Materials List*

<https://www.portland.gov/sites/default/files/2021/electrical-equipment-materials-list-2021-04-29.pdf>

1.4 DRAFTING STANDARDS

The City drafting requirements vary depending on whether the project is a Public Works Project or Capital Improvement Project. The designer can produce plans for Public Works Projects in either AutoCAD or MicroStation format. All Capital Improvement Projects require the use of MicroStation for plan production. In either case the information shown on the plans is the same. At the conclusion of each project the designer submits CAD files to the City in addition to other documentation.

Title blocks for the City of Portland vary depending on discipline. The designer will need to ensure they are using the title block that identifies the appropriate Supervising or Division Engineer. On all SSL sheets the title blocks are signed by the SSL Division Engineer and the City Engineer.

The City's Signals and Street Lighting website maintains a list of standard lighting legend items and general notes used in lighting design as well as standard symbols in both AutoCAD and MicroStation formats. Additional notes and symbols may need to be added depending on design needs. Coordinate with the SSL District Engineer for additional guidance.

The following plan sheets are typically provided with lighting designs:

- Legend and General Notes: NTS
- Street Lighting Plan: Scale 1" = 20' or 1" = 40'
- Removal Plan: Scale 1" = 20' or 1" = 40' – As needed on larger more complex designs for clarification
- Wiring Schematic: NTS – On projects with underground raceways and/or lights powered from a PBOT electrical service panel
- Lighting Details: NTS – As needed

1.4.1 *Informational Links*

<https://www.portland.gov/transportation/engineering/signals-and-street-lighting>

<https://www.portland.gov/transportation/engineering/design>

2 DESIGN REVIEW

Design review varies based on whether the project is a Public Works or Capital Improvement project. For both, the City publishes a set of Signals and Street Lighting Design Checklists (<https://www.portland.gov/transportation/engineering/documents/ssl-design-checklist>) that will help the designer develop plans, specifications, and cost estimates to meet City standards. The SSL Design Checklists are typically provided at each level of submittals.

2.1 PUBLIC WORKS PERMIT PROJECTS (PWP)

Public Works Permit projects are those that are done as part of private development. These require a minimum of the following review levels:

30% Review:

This review level is to provide PBOT with sufficient information to understand project intent and allow them to provide input on project infrastructure requirements. Lighting design requirements are typically identified at this level. This 30% review is used to establish bonding estimates for projects and allow on-site work to commence. The 30% review cycle is typically an electronic submittal.

At this submittal level, a lighting analysis should be conducted to determine lighting requirements. Prior to accepting the 30% design package, PBOT requires the SSL District Engineer to review and approve the lighting analysis.

60% Review:

This review level will include the full design including any voltage drop calculations and lighting analysis previously identified as a design requirement. Utility coordination needs should be identified at this level, including identifying new power sources if applicable. The 60% review cycle is typically an electronic submittal.

Work orders with the local electric utility should be opened by this review cycle. If the SSL District Engineer has not already provided a work order for the utility, request one from the District Engineer. It is helpful if preliminary plans are available and can be provided to the City for coordination purposes.

95% Review:

At 95%, the designer will need to submit special provisions and finalize any utility coordination. Plans should be developed to the level that they can be used for construction purposes. The 95% review cycle is typically an electronic submittal.

Final Submittal:

This is the final deliverable package submittal with unsigned plans provided to the City. Special provisions, an EOR Stamped cover sheet, and electronic CAD files are required to be submitted to the City's Bureau

of Development Services. This submittal will be signed with digital signatures via a link provided by the City.

Interim submittals are typically required to address City comments prior to the project being approved to move forward to the next submittal level. Street lighting is one of many disciplines required to submit special provisions.

2.2 CAPITAL IMPROVEMENT PROJECTS (PBOT LED)

Capital Improvement projects are developed under direct contract with the City. These projects typically require the following review submittals:

30% Design Review:

This review level is to provide PBOT with sufficient information to understand project intent and allow them to provide input on project infrastructure requirements and assess scope and budget. Lighting design requirements are typically already known at this level. Lighting analysis is typically required at this level to confirm the design concept and an engineer's cost estimate is also submitted.

60% Design Review:

This review level typically includes most design elements to be included in the plans, including voltage drop calculations for circuit design and revisions to the lighting analysis. Preliminary special provisions and cost estimates are required at this level. Utility coordination should be started at this level.

95% Design Review:

At 95%, the designer will have the lighting design completed. At this level, the engineer should have all prior comments addressed in the plans, special provisions, and engineer's cost estimate.

Final Design:

At this level, the engineer should address any final design elements the City has identified as missing or needing to be changed in the plans, special provisions, and engineer's cost estimate. At the completion of this stage all items should be bid-ready.

100% Plans:

This is the final submittal with signed documents provided to the City. There may be outstanding items that the City requests to be addressed prior to signing. Capital Improvement Projects are typically electronically signed. In addition to the plans, special provisions signed and stamped by an Engineer of Record and electronic CAD files are required to be submitted to the City.

Capital Improvement Project documentation is now tracked via the City's e-Builder website.

2.2.1 *Informational Links*

<https://www.portland.gov/bds>

<https://www.portland.gov/transportation/engineering/design>

<https://www.portland.gov/transportation/engineering/documents/ssl-design-checklist>

3 LIGHTING ANALYSIS

3.1 SOFTWARE REQUIREMENTS

AGI32 lighting software package is the required lighting analysis software for PBOT roadway and area lighting applications. Other software packages should not be utilized for submitting lighting analysis results without prior approval from SSL staff.

The AGI32 model environment should be set up correctly to meet PBOT lighting analysis requirements. There are several default settings within the program which should be consistently set up for each analysis model, including the following:

- The measurement units set to feet (ft).
- The illuminance units set to footcandles (fc).
- A Light Loss Factor (LLF) specified in the “Define Luminaire” section. LLF is a combination of several factors representing a reduction in lamp lumen output over the lifespan of the luminaire. The LLF is an incorporated factor and can be presented by: $LLF = LLD \times LDD \times UDF$.
 - Lamp Lumen Depreciation (LLD) presents deterioration of the lamp over its lifespan. LLD is based on 50,000 hours of operation using the supplier’s IES TM-21 Projecting Long Term Lumen Maintenance of LED Light Sources data for the selected luminaire. The designer can obtain this information from manufacturers or the specification sheet of the selected luminaire. In the absence of this information, further discuss the value of LLD with the SSL District Engineer.
 - Luminaire Dirt Depreciation (LDD) presents deterioration of the lamp being exposed to the roadway environment. Typically, LDD of 0.90 can be used for arterials and LDD of 0.95 can be used for collectors and local service streets. It is a good idea to confirm this LDD value for a given location.
 - User Defined Factor (UDF) can be used to model dimming factors defined by the designer. UDF is required only when dimming options or adjustable lumen output of a selected luminaire are available for use in the analysis. Available dimming options can typically be found in the manufacturer’s specification sheet.

3.2 PBOT LIGHTING GUIDELINES

PBOT uses the illuminance method for light level calculations. Illuminance is measured in footcandles. Two illuminance methods adopted by PBOT are described:

- Horizontal Illuminance Method: The horizontal illuminance method of roadway lighting design determines the amount of light that lands on the horizontal roadway surface from the

roadway lighting system. The evaluated locations typically subject to the horizontal illuminance method include travel lanes, intersections, marked crosswalks, and parking lots.

- **Vertical Illuminance Method:** The vertical illuminance method of roadway lighting design determines the amount of light that lands on imaginary vertical surfaces facing the oncoming traffic direction. The vertical surfaces are located five feet above the roadway surface to represent the height of a pedestrian. The evaluated locations that typically apply vertical illuminance method include marked crossings or any location that crossing pedestrians are present. The vertical illuminance method can describe the level of illuminance reflected onto crossing pedestrians observed from oncoming traffic. In other words, the vertical illuminance method can tell the level of visibility of crossing pedestrians.

LED (Light Emitting Diode) luminaires are the accepted light source for use on PBOT lighting installations. LED luminaires have improved energy efficiency and require low maintenance cycles compared to older lighting technology. The PBOT approved LED luminaires can be found in their *Electrical Equipment and Materials List*¹. The designer will use PBOT approved luminaires for analysis and design unless otherwise agreed upon by the SSL District Engineer.

The determination of target light levels follows PBOT lighting guidelines. The lighting design and its calculations should meet the recommended average maintained illuminance level and average to minimum uniformity ratio. Two lighting guidelines are typically utilized:

- In 2019, the City Council adopted new lighting guidelines as part of the PedPDX planning study. Based on City of Portland Recommended Light Levels and Guidelines for Roadway Lighting (PBOT Lighting Guidelines)²: These lighting guidelines were developed to adjust the minimum recommended average light levels for roadways based on user needs and specific roadway characteristics. The weighted adjustment factors that account for roadway characteristics include posted speed, traffic volume, bicycle traffic, and pedestrian traffic. This guideline is not intended to be used on local service roadways or within patterned lighting districts (e.g., River District) except as noted.
- The Illuminating Engineering Society of North America's *American National Standard Practice for Roadway Lighting, (IESNA, RP-8-21)* is the lighting standard published by the IES and is a nationally adopted compilation of lighting guideline, providing the recommendations and practices for roadway and parking facility lighting. This includes tunnel lighting applications. Typically, RP-8-21 is used as a complimentary reference when the evaluated locations are not included under the evaluation guidelines listed in the Portland Recommended Light Levels and Guidelines for Roadway Lighting.

¹ PBOT Electrical Equipment and Materials. <https://www.portland.gov/transportation/engineering/construction>

² City of Portland Recommended Light Levels and Guidelines for Roadway Lighting May 2019, <https://www.portlandoregon.gov/transportation/article/714407>

3.2.1 Roadway

To determine the recommended roadway light levels, evaluated roadways are examined based on their roadway functional classification and PBOT Lighting Guidelines. The higher average maintained illuminance value is usually selected for the recommended light levels for evaluated roadways. The following shows the procedure to determine the recommended roadway light levels.

- **STEP 1:** Based on the functional classification of the roadway, determine the minimum average horizontal recommended lighting values from Table 3-1.
- **STEP 2:** Select the appropriate roadway parameters that apply to the roadway segment to be analyzed from Table 3-2. The roadway parameters should be based on the constructed/future condition of the roadway segment.
- **STEP 3:** Once the weighted parameters are selected for each roadway lighting system, the weighted values from Step 2 are added to calculate the overall weighted value.
- **STEP 4:** Based on the overall weighted value calculated in Step 3, determine the adjusted average horizontal lighting values from Table 3-3.
- **STEP 5:** Compare the adjusted lighting value determined in Step 4 to the minimum recommended lighting value determined in Step 1. The value with the highest average maintained light level and lower uniformity ratio is used for the roadway segment.

If the higher value results in light levels that exceed those defined for the next higher roadway functional classification, use the light level defined for the next higher roadway classification. Further discuss the target light level results with the SSL District Engineer.

This process is skipped if the evaluated roadway is classified as a local service roadway.

Table 3-1. Recommended Roadway Light Levels

Roadway Functional Classification	Average Maintained Illuminance (Fc)	Uniformity Ratio (Average/Minimum)
Major Traffic/Major Transit/Traffic Access	1.0	3
District Collector	0.7	4
Neighborhood Collector - Major Transit	0.7	4
Neighborhood Collector - Minor Transit	0.6	4
Local Service	0.2	6

Table 3-2. Roadway Parameter and Weighted Value

Roadway Parameter	Element	Weighted Value
Posted Speed ^a	≥ 35 mph	2
	30 mph	1
	≤ 25 mph	0
Traffic Volume (veh/ day) ^b	> 15,000	2
	5,000 - 15,000	1
	< 5,000	0
Bicycle Traffic ^c	Major City Bikeways	2
	City Bikeways	1
	Local Service Bikeways	0
Pedestrian Traffic ^c	Pedestrian-Transit Streets/ Major City Walkways	2
	City Walkways	1
	Neighborhood Walkways	0

^a The posted speed of the evaluated roadway can be obtained from PortlandMaps – Open Data:

<https://gis-pdx.opendata.arcgis.com/datasets/speed-limits/explore?location=45.562758%2C-122.639110%2C16.62>

^b The traffic volumes of the evaluated roadway can be obtained from PortlandMaps – Open Data:

<https://gis-pdx.opendata.arcgis.com/datasets/traffic-volume-counts/explore>

^c This can be found in PBOT Transportation System Plan:

<https://www.portland.gov/transportation/planning/transportation-system-plan-tsp>

Table 3-3. Recommended Roadway Light Levels

Overall Roadway Weighted Value	Average Maintained Illuminance (Fc)	Uniformity Ratio (Average/Minimum)
≥6	1.2	3
5	1.0	3
4	0.8	4
3	0.6	4
2	0.4	4
≤1	0.2	6

3.2.2 Intersection

This section provides steps to determine light levels at intersecting streets with classifications higher than that of two local service streets. Light levels for two local service streets are recommended to be designed to a minimum of 0.2 fc and do not require the use of the following procedures.

To determine the recommended intersection light levels, examine each intersecting roadway of the evaluated intersection based on roadway functional classification and PBOT Lighting Guidelines. The highest average maintained illuminance value is selected for the recommended light levels. The following shows the procedure to determine the recommended intersection light levels.

- **STEP 1:** Based on the function classification, determine the minimum average horizontal recommended lighting values for each roadway from Table 3-1. The minimum average maintained lighting value for intersections is 1.5 times the lighting value of the intersection

roadway with the highest roadway functional classification. This does not apply to an intersection of two local service streets.

- **STEP 2:** Select the appropriate parameters that apply to each of the roadways to be analyzed from Table 3-2. The roadway parameters should be based on the constructed/future condition of the roadway segment.
- **STEP 3:** Once the weighted parameters are selected for each roadway, the weighted values from Step 2 are added to calculate the overall weighted value.
- **STEP 4:** Based on the overall weighted value calculated in Step 3, determine the adjusted average horizontal lighting values from Table 3-4.
- **STEP 5:** Compare the values developed from Steps 1 and 4. The highest value is selected for the recommended light level of the evaluated intersection.

If the higher value results in light levels that exceed those defined for the next higher roadway functional classification, then use the light level defined for the next higher roadway classification. Further discuss the target light level results with the SSL District Engineer.

Table 3-4. Recommended Intersection Light Levels

Overall Intersection Weighted Value	Average Maintained Illuminance (Fc)	Uniformity Ratio (Average/Minimum)
≥6	1.8	3
5	1.5	3
4	1.2	4
3	0.9	4
2	0.6	4
≤1	0.3	6

3.2.3 Tunnel Lighting

The City of Portland owns and maintains several tunnels with lighting systems. Tunnel lighting requires higher light levels during daytime than nighttime hours to facilitate drivers' visual adaptation. Tunnel lighting design follows *IESNA, RP-8-21 Chapter 14: Tunnel* or *IES-NA RP-22-11: Tunnel Lighting*³ to determine recommended daytime and nighttime light levels.

Three considerations for urban tunnel lighting within the city:

- Consider separating daytime and nighttime luminaires on different circuits. This will eliminate all luminaires being operational 24 hours a day.

³ Illuminating Engineering Society of North America's, American National Standard Practice for Tunnel Lighting, RP-22-11.

- Tunnels are recommended to be powered by a metered service as lighting is typically required to operate continuously.
- Consider control systems to adjust light levels. This will allow for flexibility to address public requests and allows dimming to adjust for exterior ambient light levels.

3.2.4 Pedestrian Crossings

Pedestrian zones include marked crosswalks, sidewalks, multi-use paths, woonerf streets and low speed local streets. Table 3-5 summarizes the lighting guidelines for pedestrian zones. The definition of pedestrian zones is described below:

- **Marked Crosswalk:** Marked crosswalks are intended to provide a safe and visible place for pedestrians to cross. Analyze marked crosswalks at unsignalized intersections and mid-block crossings. These locations may or may not be controlled by beacons or a pedestrian signal. Analyze the vertical illumination at a 5-foot height and oriented toward the direction of traffic.
- **Sidewalks:** Sidewalks are intended to provide a safe place for pedestrians to navigate the transportation network without conflicting with vehicles and bicyclists.
- **Multi-Use Path:** Multi-use paths are areas shared by bicyclists and pedestrians and are often located in residential or natural areas. Where multi-use paths intersect roadways, they should be treated as marked crosswalks.
- **Woonerf and Narrow Low Speed Local Streets (15 mph):** A woonerf (plural woonerven) is also known as a “living street.” A woonerf is a public space shared primarily by bicyclists and pedestrians, but also includes low-speed motor vehicles. While a woonerf is intended for local access only, the conflict area between motor vehicles and pedestrians is examined to confirm it meets the recommended light levels. Local streets with 15 mph speed limits share the same lighting design criteria, as these narrow streets are intended for vehicles, bikes, and pedestrians to share.

Table 3-5. Recommended Pedestrian Zone Light Levels

Pedestrian Zone	Horizontal Illuminance Method		Vertical Illuminance Method
	Average Maintained Illuminance (Fc)	Uniformity Ratio (Average/ Minimum)	Average Maintained Illuminance (Fc)
Marked Crosswalk	Use recommended roadway light levels	-	0.2-0.5
Sidewalks	0.2-0.9	-	-
Multi-Use Path	0.4-2.0	4	-
Woonerf/Low Speed	0.4-2.0	4	0.2-1.0

The lighting designer should consider the type of roadway and conflict points present along pedestrian zones when determining the appropriate average maintained illuminance to obtain. For example, consider designing to the upper end of the range noted in Table 3-5 for a regional multi-use path crossing

a busy arterial (typically lit to higher levels) where a higher degree of conflict may be present versus lighting to the lower range on a local street crossing (typically lit to a lower level) where low pedestrian and vehicle conflicts are anticipated.

3.2.5 Existing Lighting Information

It is often important to include existing lighting features in the analysis. In addition to obtaining information on street lighting hardware via field reviews and requests for information through the City, the lighting designer can obtain existing City owned lighting system information via an open GIS database accessible online ([City of Portland Bureau of Transportation - Street Lighting System \(arcgis.com\)](https://arcgis.com)). The database contains record drawings of existing City lighting systems and information on individual light poles, luminaires, arms, and power. The following is an example record from the database:

Status: Active
LIP Number: OH
PGE Map: D1102C
Pole Number: 683
Manufacturer: LEOTEK
Lamp Type: EC3-10M-MV-NW-2-GY-350-WL LED
Mast Arm Length: 8
Watts: 40W
Luminaire Type: Cobrahead
Power: Portland General Electric
Notes: Overhead
Power: Portland General Electric

Roadways that have been vacated and re-allocated to pedestrian malls (predominantly NW Pettygrove Street) in the past have utilized bottleneck poles with Z-15 luminaires. As this luminaire is no longer manufactured, newer fixtures are available for use in this application and should be coordinated with SSL District Engineers. See Figure 4-1 for the district map.



Figure 4-2. South Waterfront District

4.2.2 South Waterfront District

The South Waterfront District utilizes four different types of contemporary style light poles. On each corner at every vehicle intersection is a light pole with two pendant luminaires to illuminate the roadway and a third luminaire pointed at a frosted glass apron to illuminate the pedestrian facilities. Along the S Moody Avenue and S Bond Avenue couplet where the streetcar is present, twin ornamental luminaires are utilized mid-block. On all other streets, single ornamental luminaires are utilized. Transit streets also include blue wayfinding lights on top of signal, mid-block, and corner lighting/catenary standards. See Figure 4-2 for the district map.

4.2.3 Lloyd District

The Lloyd District uses twin ornamental street light poles on every street corner. Along the NE Broadway and NE Weidler Street couplet, there are tall cobrahead style light poles mid-block. Mid-block on all other minor roads are twin ornamental lights. For district map see Figure 4-3

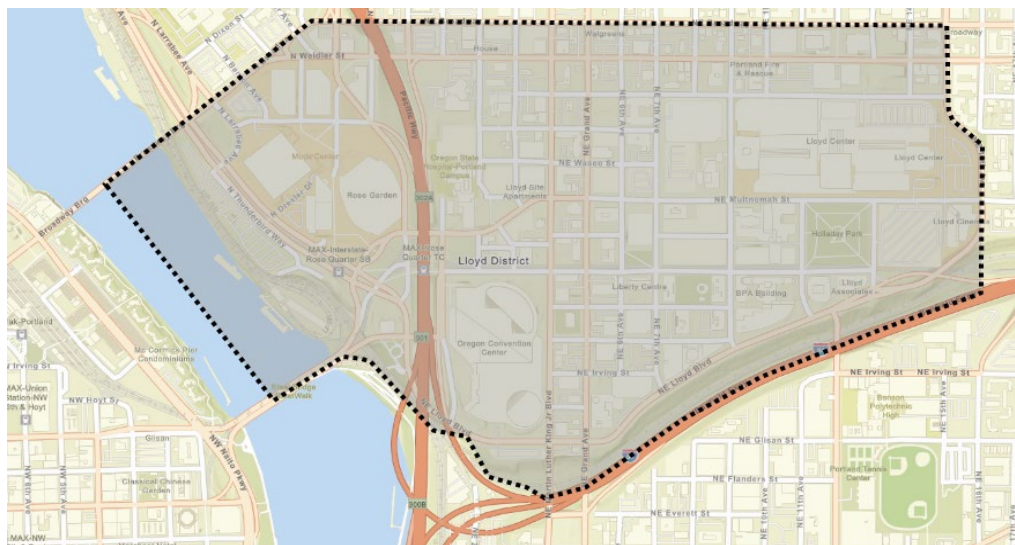


Figure 4-3. Lloyd District



Figure 4-6. Lents District

These are just a few of the well-known districts within the city and should not be considered an extensive list. Many other locations have patterned lighting. Some of these include SW Gibbs Street from S Hood Avenue to just west of SW Barbur Boulevard; Martin Luther King Junior Boulevard from NE Tillamook Street to NE Dekum Street; Alberta Street from NE Martin Luther King Junior Boulevard to NE 33rd Avenue; and NE Killingsworth Street from

Interstate Avenue to NE 6th Avenue. Coordination with SSL District Engineers will be helpful to ensure the appropriate lighting hardware is being designed for the given area.

4.3 LIGHT POLES

Light poles used for City owned applications need to be designed to meet the applicable AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals*. City approved light poles and materials do not need to be evaluated as these have already been approved for use along city roadways.

4.3.1 Typical Light Pole Types

The most prominent metallic poles used within the city are ornamental post top and cobrahead style light poles. Single ornamental, twin ornamental, 4 to 5-inch round-tapered spun aluminum and bottleneck streetlight poles fall within the category of post top light poles. These post top poles provide a pedestrian scale mounting height for luminaires while effectively lighting roadways for motor vehicles and bicycles. Mounting heights range from 16 to 20 feet depending on the type of luminaire used.

For typical cobrahead installations, steel, aluminum, wood (streetlight only poles) and utility poles may be used. Typical mounting heights range from 30 to 35 feet. Depending on the project location and the lighting analysis, other mounting heights may be considered with the City's approval.

Utility pole mounted cobrahead luminaires within the city limits are owned and maintained by the City. Mounting heights for these luminaires can range from 25 to 35 feet in most cases. A mounting height of 28 to 30 feet is relatively common.

Refer to PBOT's standard drawings P-651 through P-659. See Figure 4-7 for light poles commonly used when not within the lighting district. The following factors should be considered when determining light pole use:

▪ Ornamental Streetlight Poles

- Commonly used within defined lighting districts.
- Within subdivisions if approved by the City and developer.
- Occasionally at Pedestrian crossings. Typical application for single ornamental or bottleneck style of pole.
- Infill lighting on roadway segments and intersections where overhead utilities limit the use of cobrahead luminaires.



Figure 4-7. Typical Approved Light Poles

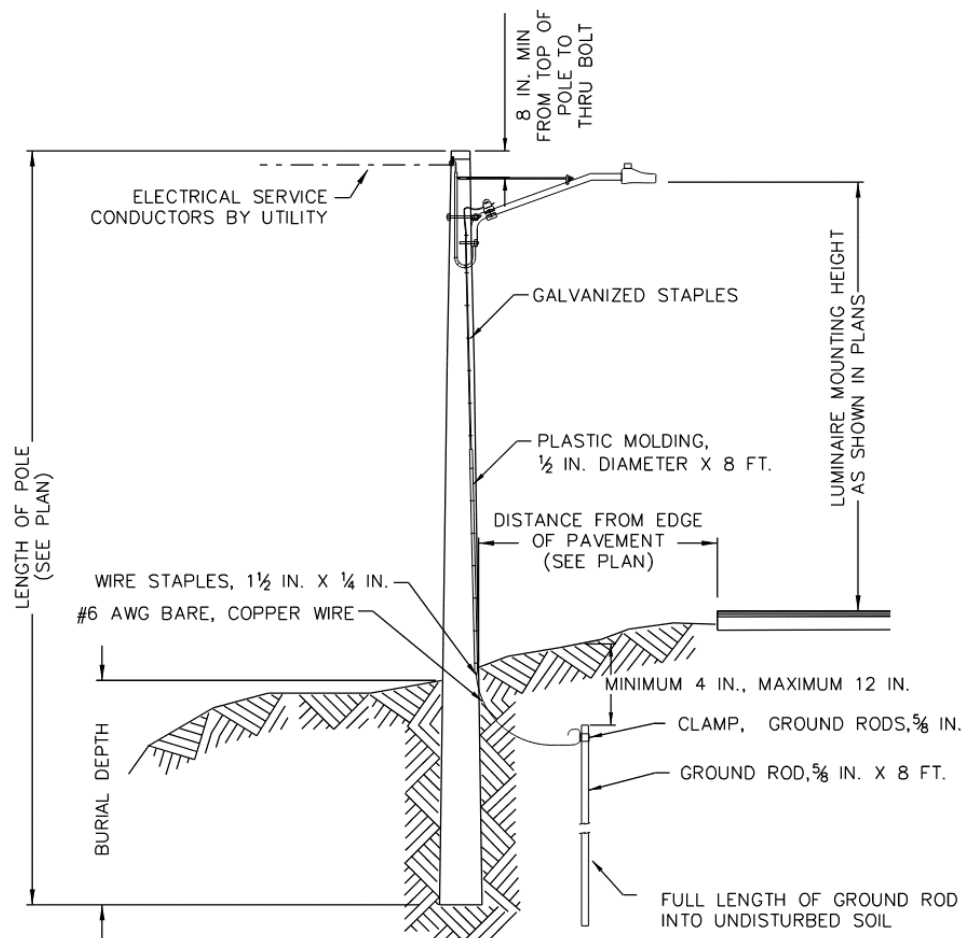
▪ Cobrahead Streetlight Poles

- Steel and Aluminum Poles
 - Typical on streets with higher function classification and heavier vehicle volumes such as arterials and collectors. Commonly use 30 and 35-foot mounting heights. SSL District Engineers will identify the appropriate pole material to use. Current materials include anodized spun aluminum and galvanized steel poles.
 - New subdivisions typically use aluminum poles with up to 30-foot mounting heights.
- Wood Streetlight Only Poles and Utility Poles
 - In inner city residential neighborhoods and some newer subdivisions, typical mounting heights are 25 to 30 feet. Coordinate with the SSL District Engineer if alternative mounting heights are necessary due to overhead utilities.
 - For arterial and collector level roadways, typical mounting heights are 30 and 35 feet. Coordinate with the SSL District Engineer if alternative mounting heights are necessary due to overhead utilities.
 - Wood streetlight only poles for typical street lighting applications are Class 4, machine shaved and treated Douglas Fir. See Table 4-1 for typical pole lengths and depth of pole settings. See Figure 4-8 for typical wood pole installation details.

Table 4-1. Pole Length and Setting Depth for Wood Poles

Length of Pole (Feet)	Burial Depth (feet) ¹	
	Depth in Soil	Depth in Rock
25	5.5	3.5
30	5.5	3.5
35	5.5	4.0
40	6.0	4.0
45	6.5	4.5
50	7.0	5.0

¹Where poles are located in non-level areas, measure the setting depth from the low side of the pole.

**Figure 4-8. Wood Streetlight Only Pole Installation**

- When using utility poles for mounting City owned streetlights, the designer must follow NESC standards. Section 234B and 238 of the NESC provide various guidance on required clearances. In addition, utility pole mounted luminaires owned by the City are required to be protected by an in-line fuse. Utilization of utility poles for roadway lighting also requires coordination between the SSL District Engineer and Utility.

- Use of non-standard light poles
 - To be considered on a case-by-case basis. The approval process can take an extensive amount of time. The process to gain approval should begin as soon as is practical.
 - Must provide structural information from an Oregon licensed structural engineer.
 - Provide reasoning for use.
 - Anchor bolts and base plates to meet City standards, which provide flexibility for future pole replacements if the original manufacturer is no longer in business.
 - Luminaire mounting tenons should meet City typical tenon mounts and not be vendor specific.
 - Consider maintainability of pole design. Pole material, paint, replacement costs, pole access points.

Figure 4-9 shows a sample light pole schedule to be used on PBOT lighting plans. This table assumes standard hardware and is typically accompanied by “General Notes” that provide additional descriptions of pole materials and paint colors (if required).

4.3.2 Small Cell Poles

The city has a growing number of locations where light poles are designed to support small cell wireless communications. The City maintains Standard Drawings P-667 to P-669 for design and installation requirements of these poles. A critical design element for these poles is that the small cell has a completely independent power source from the lighting. SSL requires a separate ground-mounted Type “C” service panel to feed the light on small cell poles.

For projects with the light pole schedule on each plan sheet

LIGHT POLE SCHEDULE									
POLE NO.	STREET	STATION	OFFSET*	POLE TYPE	LUMINAIRE				
					LUMINAIRE ARM	MOUNTING HEIGHT	TYPE	LUMEN OUTPUT	CHARACTERISTICS
1	NE HALSEY ST	108+67 LT	2.5'	ALUMINUM	6'	30'	II	8400	LED COBRA HEAD STYLE, 3000K COLOR TEMPERATURE, OR APPROVED EQUAL.

*OFFSET IS MEASURED FROM FACE OF CURB TO CENTER OF POLE.

For projects with the light pole schedule table on a separate sheet

LIGHT POLE SCHEDULE										
POLE NO.	STREET	STATION	OFFSET*	POLE TYPE	SHEET NUMBER	LUMINAIRE				
						LUMINAIRE ARM	MOUNTING HEIGHT	TYPE	LUMEN OUTPUT	CHARACTERISTICS
1	NE HALSEY ST	108+67 LT	2.5'	ALUMINUM	IL-2	6'	30'	II	8400	LED COBRA HEAD STYLE, 3000K COLOR TEMPERATURE, OR APPROVED EQUAL.

*OFFSET IS MEASURED FROM FACE OF CURB TO CENTER OF POLE.

Figure 4-9. Sample Light Pole Schedule

4.3.3 Light Pole Finish

Painting

The City paints ornamental poles and some steel cobrahead style poles. The color of the paint is dependent on the location. Colors can be characteristic of lighting districts or other features such as transit corridors. The City identifies the available colors that can be used in their Standard Specifications. Currently accepted colors include the following:

- Transit Blue MC-Luster (W211.0233)
- Historic Black MC-Luster (W211.79)
- Portland Green MC-Luster (W211.0227)
- Gold MC-Luster (W211.0226)
- Cascade Green MC-Luster (W211.0225)
- Chinatown Red MC-Luster (W211.0261)
- Silver MC-Luster (W211.82)
- Transit Mall Dark Silver MC-Luster (W211.8002)

The lighting designer is required to specify the appropriate color to use in the design. The City's typical application is factory primed with a field applied topcoat of paint. The City's standard "General Notes", available online, have requirements for priming and painting poles that need to be included in the plans.

Factory applied powder coats may also be used on city streets. This is a less common paint application method used within the city.

On projects with existing painted poles that will remain or be relocated, SSL requires that those poles be cleaned and repainted.

Painting and cleaning requirements need to be coordinated and approved by the SSL District Engineer early in the design process. Requirements for cleaning, priming, and painting need to be documented in the General Notes.

Anodizing

Spun aluminum poles used within the city may be natural aluminum or anodized to add color. The City has typically used a dark bronze anodizing for colored aluminum poles. Anodizing needs to be confirmed with the City and the requirements added to the General Notes for the project.

4.3.4 Pole Tags

Poles owned by the City have inventory tags that are cross-referenced to the City's GIS system where pole information can be obtained. Existing poles that are noted for removal should have the inventory tag removed by the contractor and returned to the City. The design engineer will support this by adding a General Note to the plans indicating the return of existing pole tags to the City.

New poles will receive new tags furnished and installed by SSL. This may be added to the plans but is typically something included during construction. Figure 4-10 is an example of a City pole tag.



Figure 4-10. Pole Tag

4.3.5 Pole Attachments

Wood poles and larger diameter metallic light poles are available in certain instances for attaching non-SSL devices. Consult the SSL District Engineer if there is a desire to attach devices to light poles. Items you will commonly find attached include:

- Regulatory, warning and guide signs
- Banners – typically only in the Downtown core on twin ornamental poles
- Traffic and pedestrian signal heads

4.3.6 Poles to Remove

Most cobrahead style streetlight poles within the Downtown core are owned by the City but may still consist of utility owned direct buried power feeds. These are easily identified as they are typically made from spun aluminum. These poles should be identified for removal by the utility and replaced with City owned light poles fed from a lighting service panel. Per terms of agreement between PBOT and PGE, the City will accept ownership of direct-fed underground raceways once they are impacted by Capital Improvement projects or private developments.

Older twin ornamental light poles may be rod style poles. These can be identified by three steel rods that extend from the foundation up into the lower third of the pole. These poles are no longer considered structurally sound and require replacement when a project impacts the adjacent sidewalk. See Figure 4-11.

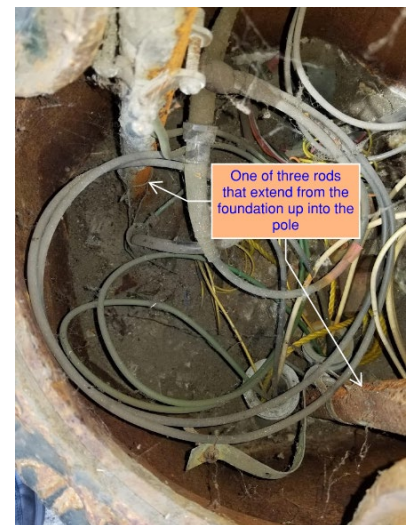


Figure 4-11. Rod Style Pole

4.4 LUMINAIRES

All new installations owned and maintained by PBOT are required to utilize light emitting diode (LED) luminaires with a “UL” (Underwriters Laboratories for fire and electrical safety) label or Oregon approved equivalent. Specify luminaires identified in the City’s Approved Electrical Equipment and Materials List. The following are key luminaire characteristics to be considered in lighting design:

- Other than the standard single ornamental acorn, twin ornamental acorn, and globe luminaires (located within the South Auditorium District and along SW Terwilliger Boulevard), the City prefers post top luminaires that are Dark Sky compliant. The City has added a number of these to its approved Electrical Equipment and Materials List for use on public and private projects. As the city has some districts that are not Dark Sky compliant, coordinate with the SSL District Engineer to confirm the luminaire selection.
- Determine the luminaire wattage, number of LEDs, voltage, and light distribution by photometric analysis. Match lumen output and distribution type indicated in the City’s Approved Electrical Equipment and Materials List.
- Maximum correlated color temperature of 3000°K (Kelvin) for arterials and 2700°K in neighborhoods.
- Use of non-approved luminaires:
 - To be considered on a case-by-case basis. The approval process can take an extensive amount of time. The process to gain approval should begin as soon as is practical.
 - Plan to provide a sample luminaire.
 - Provide product from known reputable vendors.
 - Consider luminaire materials and construction. The luminaire should be designed to meet strict US-based standards.
 - For luminaires installed on structures other than conventional poles, the designer will need to contact the SSL District Engineer.

The lighting plans will include a light pole schedule identifying the luminaire’s light distribution and lumen output and can include any additional information that may be needed for clarity. See Figure 4-9 for a sample light pole schedule table.

4.5 ARMS

Luminaire arms support the luminaire on the pole's lateral dimension. Luminaires are usually placed to overhang the roadway's edge or bike lane. The exception to this is the City’s twin ornamental poles which are placed so that luminaires are located behind the curb line.

The length of luminaire arms is typically determined by the type of light pole used in the design, outcome of the lighting analysis and roadway geometrics. For cobrahead style light pole and utility pole mounted

luminaires, the City uses 4-foot, 8-foot, 12-foot, and 16-foot-long arms. Luminaire arms for twin ornamental poles are a standard 34 inches (17 inches to each side of the poles' center). Combination mast arm poles (CMAP) at signalized intersections commonly use luminaire arms that are specified in 2-foot increments, up to 16 feet.

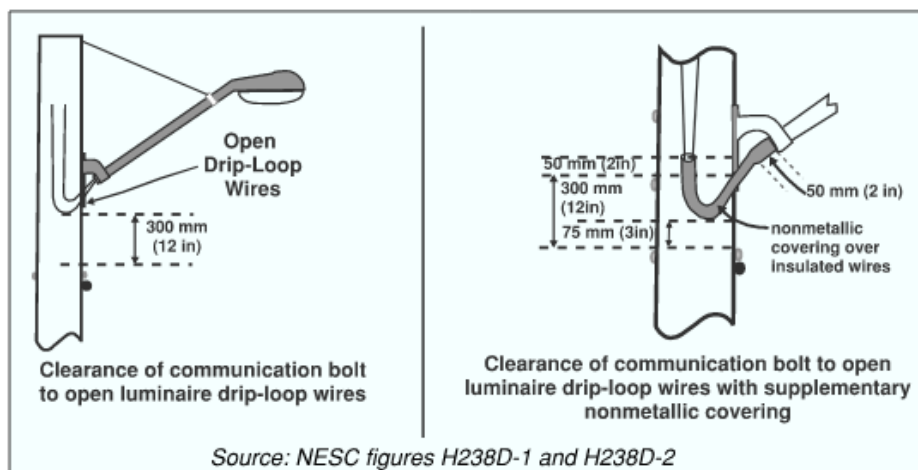
Light pole arms attached to utility poles that are from 12 feet to 16 feet long require wind rods. Wind rods come in different forms depending on the manufacturer and pole configuration.

Table 4-2 summarizes NESC recommended vertical clearance requirements of span wires and brackets (luminaire arms) from communication lines when attached to utility owned poles. Grounding luminaires and arms allows for a reduction in those clearances. A further reduction is allowed when electrical conductors are covered with non-metallic coverings. See Figure 4-12.

Table 4-2. Vertical Clearance of Span Wires & Brackets from Communication Lines & Equipment

Length of Pole (Feet)	Carrying Luminaires, Traffic Signal, or Trolley Conductors	
	Non-Effectively Grounded	Effectively Grounded
	(in)	(in)
Above communication support arms	40	20 ¹
Below communication support arms	40	24
Above messengers carrying communication cables	40	4
Below messengers carrying communication cables	40	4
From terminal box of communication cables	40	4
From communication brackets, bridle wire rings, or drive hooks	40	4
¹ This may be reduced to 12 inches from either span wires or metal parts at points 40 inches or more from the surface. See Figure 4-11 (Source: NESC).		

Luminaire arms come in a variety of forms, depending on their length and the material used to make them. For cobrahead style poles, arms are typically made from galvanized steel. Aluminum arms may be used for aluminum pole applications.



Note: An in-line fuse is also required for City owned utility pole mounted luminaires.

Figure 4-12. Clearance of Communication Bolt to Open Luminaire Drip-Wires

4.6 LIGHT POLE FOOTINGS

City Standard Light Pole Footing

City standard streetlight pole footings are designed based on the common soil types around the greater Portland area which has predominantly silt-type soil characteristics with an internal friction angle of 26° and soil effective unit weight of 100 PCF. City standards require poles to be placed in native soil conditions. The standard light pole footing is designed to accommodate approved City poles and is shown in PBOT Standard Drawings P-660.

If City standard footings are placed in areas of fill soils (undisturbed soil), Standard Drawing P-660 identifies site-specific characteristics such as ground water that may lead to a need for a deeper footing.

Non-Standard (Custom) Footings

Non-standard (custom) slip base and fixed base light pole footings should be designed according to the current AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals*.

When considering the use of PBOT custom pole footings for basement and vaulted sidewalk areas that are shown in PBOT Standard Details P-662 and P-663, it is often better to have a special footing designed to integrate the footing into the structure (basement wall or basement ceiling). This can reduce the potential for water leakage over time.

Additionally, the City maintains a variety of custom footing designs that may be used for various non-standard applications. These custom footing designs are shown in PBOT Standard Drawings P-661 through P-665 and P-669.

When conditions necessitate the use of custom footings, whether it is a new footing design or one of the City's custom footing drawings, the footing must be evaluated and stamped by an Oregon licensed structural engineer.

Existing Footings in Rebuilt Sidewalks

Light poles with anchor base foundations may be candidates for minor vertical adjustments where the surrounding sidewalks grades are being adjusted. There are many factors and field conditions to be considered:

- Type and manufacturer of the pole.
- Manufacturer's recommended pole anchor bolt projection.
- Maintaining grades so anchor plates are not below grade and water does not pool.
- Grout pad is from 0.5 inch to 1 inch above grade.

The SSL District Engineer has the final approval on whether adjusting the pole to grade is acceptable or the foundation must be replaced.

4.6.1 Light Pole Locations

Pole spacing and arrangement is determined by the photometric performance of the luminaire, light pole parameters (mounting heights, arm lengths) and roadway geometry. Pole parameters and luminaire wattage can be determined by the lighting analysis described in the previous sections. Areas that typically require nighttime illumination include the following:

- Intersections
- Roadway segments
- Dead-ends (ensures visibility of barriers and end of roadway markers)
- Cul-de-sacs
- Marked pedestrian crossings
- High-volume conflict areas

Aside from the technical requirements of the lights, the arrangement of streetlight poles along the street may have a significant impact on the aesthetic of the street during the daytime. The lighting industry has categorized pole placement into four standard arrangements: one-sided, opposite, staggered, and

median lighting. Figure 4-13 is from the *FHWA Lighting Handbook* and summarizes these pole placements. Staggered and opposite are the most common arrangements found within the city.

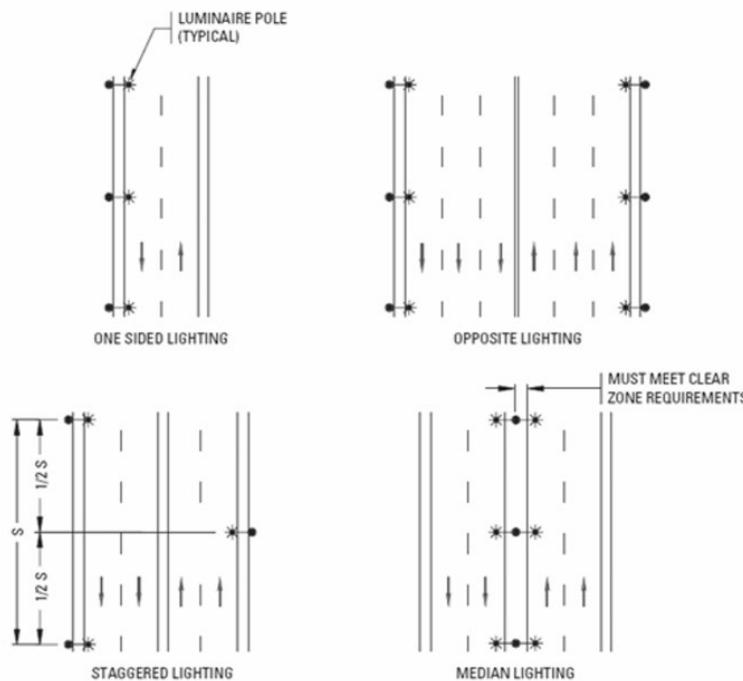


Figure 4-13. Light Pole Placement

Setback

Setback is the horizontal distance between the center of a light pole and the edge of travel way. Typically, a minimum 2.5-foot setback from the face of the curb or edge of travel way to the center of the pole is used. When planters are available, light poles are usually centered within planter areas and aligned with trees to minimize a cluttered look of trees and poles.

Pole setbacks need to place poles outside of pedestrian zones and allow a minimum 5 feet of clear accessible sidewalk space to meet the City's ADA requirements. Coordinate with the SSL District Engineer for pole placement alternatives if this minimum cannot be achieved.

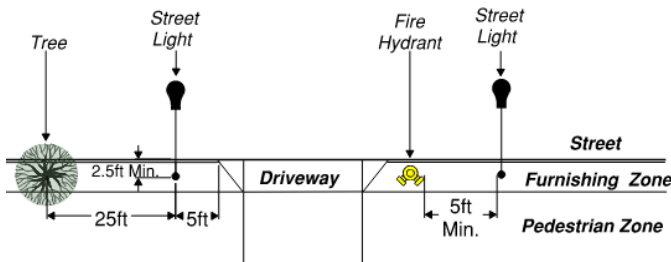


Figure 4-14. Typical Clear Space Requirements for Light Poles

Driveways

Light poles should be installed to maintain a minimum of 5 feet from the top of a driveway wing to the center of pole. This helps ensure poles are not damaged by vehicles off-tracking as they enter driveways. See Figure 4-14 for typical clear space requirements when installing light poles.

Street Trees

Unless otherwise approved by the City, a minimum 25-foot spacing between streetlights and trees must be maintained. If a tree is a species with a columnar canopy, 15-foot minimum spacing is allowed.

Tree to light pole spacing requirements will be triggered when new lights are installed on existing utility poles. Both the SSL District Engineer and Urban Forester should be involved when new light installations impact existing and future trees. Figure 4-15 is from the current Portland Parks and Recreation *PP&R Urban Forestry Street Tree Planting Standards* (<https://www.portland.gov/sites/default/files/2020/street-tree-planting-standards-2-26-20.pdf>). This figure provides a depiction of the current typical pole to tree spacing requirements.

Appendix A: Street tree spacing diagram

Street tree minimum spacing distances:

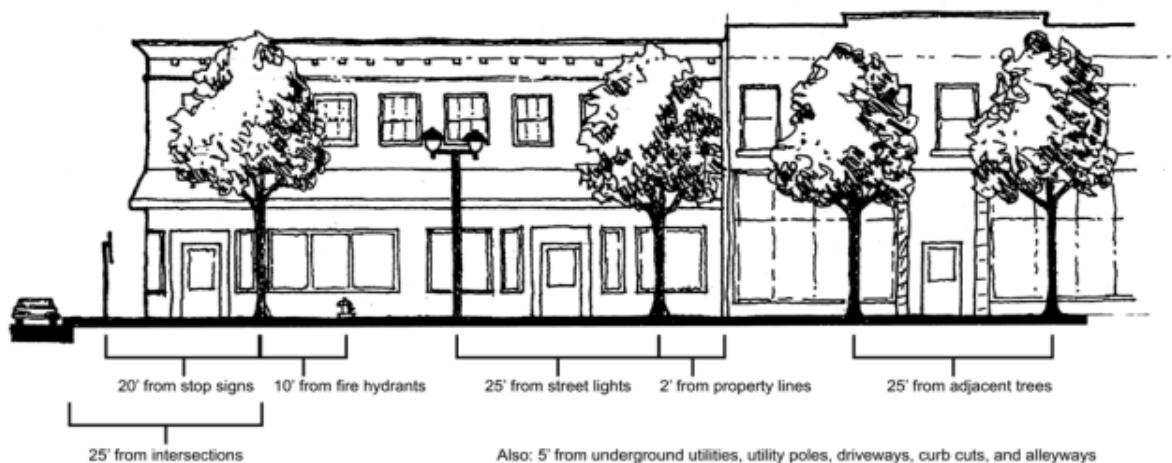


Figure 4-15. PP&R Urban Forestry Street Tree Spacing

Water Features

The lighting designer must consider water facilities owned and maintained by the Portland Water Bureau (PWB) when determining the location of light poles. See the PWB *Utility Protection Plan* (<https://www.portland.gov/water/water-development-services/documents/utility-protection-plan/download>) guidance for additional restrictions. The following are typically considered during lighting design:

- No underground installations including light pole foundations, junction boxes, and vaults are allowed to be installed within 5 feet of a water line or vault.
- There must be a minimum of 5 feet horizontal clearance between the outside of a hydrant and any other above-ground obstruction to allow Fire Bureau access to the hydrant.

Overhead Utilities

Utility conflict issues should be identified and resolved in the design phase. It is necessary to identify the conflict and coordinate with the appropriate parties. A key in defining conflicts is to remember that PBOT follows *National Electric Code* (NEC), and the utility will follow the *National Electric Safety Code* (NESC). Each code defines conflict differently depending on the maintaining party.

A minimum clearance requirement from overhead high voltage lines is to meet the requirements of OAR 437-002-0047. Utility conflict issues should be identified and resolved in the design phase. A general rule is to maintain a minimum distance of 10 feet from overhead electrical conductors. Refer to the OAR for additional requirements.

4.7 UNDERGROUND CONDUIT AND PULL BOX SYSTEMS

4.7.1 Conduits

PBOT requires the use of electrical conduits for all new underground electrical installations. All conduit installation will meet the City's requirements outlined in the City of Portland *Standard Construction Specifications* and the NEC.

Type

For typical installations, PVC schedule 80 conduits for street lighting are required. When horizontal directional drilling (HDD) is used to install conduits, HDPE conduits are an allowable alternative. Rigid metallic conduits are typically used for conduit bends and elbows in foundations and on structures and may be required when conduit depth is reduced below 36 inches to avoid an underground obstruction.

PVC coated conduits can be considered in locations that are subject to harsh environments and ongoing wet conditions. This is currently limited to tunnel installations within the city.

Sizing

Conduits should be sized to fit the street lighting conductors and cables that will run through them. To ensure compliance with the NEC and to offer enough capacity for installation of future conductors, the designer is required to verify conduit fill for all conduit runs. General PBOT conduit sizing for street lighting ranges between 1-inch minimum conduit up to 3-inch maximum conduit. These include the following typical conduit installations:

- 1.5-inch – between the light pole and adjacent junction box
- 1-inch – utility junction box to pole mounted service panel
- 2-inch – utility junction box to Type C service panel
- 2-inch – main runs between junction boxes
- 3-inch – main runs for roadway crossings
- 3-inch – main conduit run from Type C service panel to home run junction box
- 3-inch – typically required by utility from power source to utility junction box

Table 4-3 provides the NEC and PBOT maximum fill requirements for conduits based on the number of conductors.

Table 4-3. Conduit Fill

Conduit Size (inch)	Internal Diameter (inch)	NEC % Max Fill (in ²)	PBOT % Max Fill (in ²)
		3+ Wire 40%	All 25%
1	1.06	0.36	0.22
1 1/4	1.39	0.61	0.38
1 1/2	1.62	0.83	0.52
2	2.08	1.36	0.85
2 1/2	2.49	1.95	1.22
3	3.09	3.00	1.88

Note: NEC and PBOT Maximum Fill.

The City uses a maximum fill value of 25% for new and existing conduits to provide ample capacity for future conductors. In cases where new conductors are being added to existing conduits and existing conductors will remain, PBOT allows conduit fills in existing conduits up to the NEC maximum fill value of 40%. Prior to designing to NEC maximums, coordinate with PBOT staff. Table 4-4 provides the cross-sectional area of typical conductors used in PBOT installations.

Table 4-4. Wire Area

Wire (AWG)	AREA (in ²)
#10 XHHW	0.02
#8 XHHW	0.04
#6 XHHW	0.06
#4 XHHW	0.08
#3 XHHW	0.10
#2 XHHW	0.11

Note: For reference only, verify wire sizes.

Location

Typical Installation

Typically, route conduit runs under sidewalk 2 feet from the right-of-way line or the back of sidewalk unless otherwise directed. Site characteristics and underground utilities may dictate a variation in placement. Conduits running parallel to the curb should not be installed under the sidewalk within 3 feet from the face of curb. This zone is reserved for poles, utility vaults, and other similar structures.

Conduits crossing streets should be laid perpendicular to the centerline of the street and embedded at a depth of 36 to 42 inches. This may be reduced to a depth of 24 inches per NEC to avoid existing underground utilities. A design exception is required to reduce the conduit depth from the City's standard.

Horizontal Directional Drilling (HDD)

The use of horizontal directional drilling is allowed. The lighting designer may specify this on Public Works projects; however, it is not typically specified on Capital Improvement projects and is considered a contractor's decision to use this installation method.

There are some instances when HDD methods are beneficial:

- Areas with pavement moratoriums
- Streets with streetcar tracks
- Streets with light rail track alignments

There are several risk factors to consider when determining whether to use HDD conduit installation methods:

- Number of existing underground utilities
- Cost of pavement restoration for open trenching versus the risk of HDD
- Known soil conditions east of I-205 often include large boulders making HDD infeasible

Water Features

When electrical conduits cross water lines, ensure a minimum 1.5 feet of vertical clearance between electrical conduit and existing water mains of up to 16-inch diameter, or 2 feet of vertical clearance between electrical conduit and existing 36-inch diameter water main.

For electrical conduits installed parallel to an existing water main of up to 16-inch diameter, a minimum 5 feet of horizontal clearance is required between water line and the installed conduit.

If electrical conduits are installed via directional drilling, potholing of the existing water main is required when the horizontal clearance between the drilled utility and the existing water main is less than 8 feet. Contractor is required to monitor the location of the drilling to assure the minimum clearance is maintained.

PWB must be notified and coordinated with before any electrical installations near water features.

Utility Conduits

Utility owned conduit requirements are specified and inspected by the utility.

- PGE specifies guidance for service conduits in Section 6.3.2 of their *Electrical Service Requirements* (ESR) guide. Typical power service conduits are 3-inch diameter with minimum 36-inch radius sweeps. Sweeps are to be separated by 5 feet of straight conduit and a minimum 3 feet of straight conduit is required from a vault. See the ESR for additional requirements.
- Pacific Power and Light (PP&L) also specifies conduit requirements for service conduits in Section 5 of their *Electric Service Requirements* (ESR) *Manual*.

Although the City does not install nor inspect the utility's conduit infrastructure, it is important for the designer to understand utility requirements when placing service conduits. The designer should provide general guidance to the contractor to follow PGE or PP&L specifications when installing service conduits.

4.7.2 Pull Boxes

Pull boxes provide a way to pull conductors long distances without placing excessive strain on the conductors or insulation. In addition, pull boxes make splicing, tapping, or positioning of conductors easier.

Type

PBOT uses two pull box sizes for roadway lighting:

- Type "A" = Dimensions: 17" L x 10 ½ " W x 12" H
- Type "B" = Dimensions: 24 ½ " L x 13 ¼ " W x 12" H

Type “A” pull boxes are usually installed adjacent to the illumination pole for conduit sweeps into the pole with smaller conductors. Type “B” pull boxes are usually installed near the electrical service cabinet to serve as the first access point for lighting circuits and at roadway crossings.

Sizing

Size selection of pull boxes follow the requirements per NEC Section 314.28. In general, pull box sizes are determined by the intended function of the pull box and the number and sizes of conduits entering the pull box. According to the NEC, where splices or where angle or U pulls are made, the distance between each entering conduit (wall to wall) should be no less than six times the size of the largest conduit in a row. Based on this guidance, and due to the variation in conductors and splicing that may occur, the following is recommended for the maximum conduits to be installed within each pull box:

- Type “A” Pull Box = Total conduit diameter – 6 inches or less
- Type “B” Pull Box = Total conduit diameter – 12 inches or less

Location

The installation of pull boxes and utility junction boxes follow PBOT and electric utility guidance. In complex urban settings where the exact position of sidewalk boxes is needed to meet distance requirements to adjacent utilities and other facilities, the designer may need to add station/offset callouts to remove the flexibility for a contractor to select a different location for installing the boxes. Work with the SSL District Engineer to determine if this is needed on a particular project.

For PBOT owned lighting pull boxes, the following apply:

- Install pull boxes no more than 300 feet apart.
- Do not install pull boxes in pedestrian through zones, pedestrian ramps, or driveways.
- Install a pull box at each light pole location to accommodate splicing and access to the light pole from the main conductor run.
- For unpaved areas, install a Commercial Grade Concrete (CGC) apron per PBOT Standard Drawing P-632.
- In areas with pavers over looser soils within the furnishing zone, install a modified PCC apron just below the paver section to provide stability to the box.

Utility Junction Boxes

Electrical service providers within the city of Portland are PGE and PP&L. Each electrical utility company has its own requirements for utility junction boxes in terms of ownership, size, type, and location. The following applies:

- PGE owns the utility junction boxes within its service territory and they are typically 17" W x 30" L x 18" D in dimension.
- PGE specifies a minimum distance from transformers and vaults that hardware can be placed. Guidance is provided in Section 6.3.2 of their *Electrical Service Requirements* (ESR) guide. The location of the utility junction box is dependent on the power source and conduits. Assuming a 2 to 4-inch conduit diameter, conduit sweeps are required to have a minimum radius of 36 inches. Sweeps are to be separated by 5 feet of straight conduit and a minimum 3 feet of straight conduit is required from a vault. See the ESR for additional requirements.
- PP&L considers ownership of the utility junction box to be by the customer, if possible. Within the city of Portland, this would typically be a Type "B" pull box.
- PP&L utility junction box is also dependent on the power source and conduit. Guidance is provided in Section 10.1, Figure 71 of their *Electrical Service Requirements* (ESR) *Manual*. Assuming a 2 to 4-inch conduit diameter, conduit sweeps are required to have a minimum radius of 36 inches. Sweeps are to be separated by 3 feet of straight conduit and a minimum 3 feet of straight conduit is required from a vault. See the ESR for additional requirements.
- Utility junction boxes to be placed within 25 feet of the service cabinet and no further than 50 feet from the electrical power source. Coordinate with SSL District Engineer if design requirements cannot be met.

Early in the design process, work orders should be initiated with the electric utility providers to identify the size, type, and location of utility junction boxes, conduits, wiring, and other electrical service requirements. For both PGE and PP&L electrical service the City will initiate the work order. Once this has been initiated, the lighting designer can coordinate design elements. Work orders should be initiated no later than at the 60% design level. Coordinate with the SSL District Engineer if a work order number has not been provided.

When conduit routing between the utility junction box and the service panel necessitates the use of extra pull boxes to comply with the NEC, label the additional pull boxes with "COP Electrical" on the lid.

4.8 WIRING

PBOT typically uses 120/240 VAC power for illumination. Typical installations will only utilize 120 VAC. Table 4-3 provides typical conductor sizes for the cross-sectional areas that are in use on PBOT lighting installations.

4.8.1 Conductor Size and Type

The following conductor sizes and types are typically used for PBOT lighting systems:

- Feeder conductors for cabinet power:
 - 3-No. 2 AWG IMSA 50-2 for 100A main breakers

- 3-No. 6 AWG IMSA 50-2 for 60A main breakers
- 3-No. 8 AWG IMSA 50-2 for 20A main breakers
- Illumination conductors (light pole to adjacent junction box) – No. 10 AWG XHHW
- Illumination conductors (main power run between junction boxes) – No. 8 AWG up to No. 2 AWG XHHW. The size of conductor is dependent on voltage drop requirements
- Photo electric relay (PE) conductors – Consists of three No. 10 AWG XHHW or THWN running between the electrical service cabinet and the master photo electric relay
- Locate wire – No. 12 THWN Yellow (not typically shown on plan sheets)
- Ground conductor – No. 10 AWG to No. 2 AWG THWN green insulation or bare (sized to the largest current carrying conductor within conduit run)

THWN conductors consist of stranded copper conductors with a PVC insulation and nylon jacket. XHHW conductors consist of stranded copper conductors with a cross linked polyethylene insulation.

Conductor sizes for illumination circuits are determined by calculating the allowed voltage drop per the NEC and ensuring the ampacity of the conductors is not exceeded by the applied load. Ampacity is covered in Section 4.8.3. Minimum allowable wire size is #10 AWG and maximum is #2 AWG for City lighting systems. Minimizing conductor sizes allows more fill room in conduits reduces project costs, and smaller conductor sizes are easier to work with when installing and maintaining the lighting system.

For conductors running from each light pole to the adjacent pull box, the City only utilizes 10 AWG XHHW conductors.

4.8.2 Voltage Drop Calculations

To determine the appropriate conductor size to use in the circuit design and the number of lights that can be assigned to a circuit, the designer should perform voltage drop calculations and submit them to PBOT for review. The system voltage drop should be under 4% per the NEC. The maximum voltage drop on the branch circuit (distribution) side of the system is 3%. Between the utility service point and the service panel, the maximum voltage drop should not exceed 1%. The formula for voltage drop is as follows and a sample calculation shown in Figure 4-16.

$$V_{\text{drop}} = 2 * I * L * R$$

V_{drop} = Voltage Drop

2 = Number of current carry conductors (power goes out and back using two wires)

I = Current load on segment being analyzed (Amperes)

L = Length of conductors carrying the load (Ft)

R = Conductor resistance per foot (Ohms)

The current load (I) on a segment is determined by dividing the total watts on the segment by the voltage serving the load. If a circuit branches out into multiple legs, each leg of the circuit will need to be analyzed to determine the highest voltage drop value to use in the design.

Lighting circuits within the city are typically designed with light poles adjacent to one another located on the same circuit until the voltage drop exceeds the allowed 3%. It is not uncommon to find older installations that alternate circuits from one light pole to the next. This approach is no longer used in lighting design for the City.

The distance (L) is determined by adding the distance between each pull box and the service cabinets. Allocation should be considered for conduit sweeps and spare wire that may be coiled in each junction box.

Voltage Drop Calculation

Project: xxx
 Date: xxx/xxx/xxx
 Service Panel: A
 Circuit Number: 1
 Analyst: xxx

Circuit Service Voltage = 120 VAC
 Luminaire #1 = 60 Watts
 Luminaire #2 = 0 Watts
 Luminaire #3 = 0 Watts
 Luminaire #4 = 0 Watts
 Luminaire #5 = 0 Watts
 Unit Operating Factor = 1.00 (1.2 for HPS, 1.0 for LED)
 Allowable Voltage Drop (3%) = 3.6 Volts

Colored cells are for user input.

Circuit Segment	Conductor Size	Length - L (Feet)	Luminaire #1		Luminaire #2		Luminaire #3		Luminaire #4		Luminaire #5		Sum of Load - I	Resistance - R	Voltage Drop (2ILR)	Sum of Voltage Drop	Ampacity Check
			# of Lum	Load on Segment	# of Lum	Load on Segment	# of Lum	Load on Segment	# of Lum	Load on Segment	# of Lum	Load on Segment					
Cabinet to JB	8	8	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	4.00	0.000809	0.051776	0.05	Wire Size OK
JB to JB	8	60	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	4.00	0.000809	0.38832	0.44	Wire Size OK
JB to LP-1	8	60	1	0.50	0	0.00	0	0.00	0	0.00	0	0.00	4.00	0.000809	0.38832	0.83	Wire Size OK
LP-1 to LP-2	8	60	1	0.50	0	0.00	0	0.00	0	0.00	0	0.00	3.50	0.000809	0.33978	1.17	Wire Size OK
LP-2 to LP-3	8	60	1	0.50	0	0.00	0	0.00	0	0.00	0	0.00	3.00	0.000809	0.29124	1.46	Wire Size OK
LP-3 to LP-4	8	60	1	0.50	0	0.00	0	0.00	0	0.00	0	0.00	2.50	0.000809	0.2427	1.70	Wire Size OK
LP-4 to LP-5	8	60	1	0.50	0	0.00	0	0.00	0	0.00	0	0.00	2.00	0.000809	0.19416	1.90	Wire Size OK
LP-5 to LP-6	8	60	1	0.50	0	0.00	0	0.00	0	0.00	0	0.00	1.50	0.000809	0.14562	2.04	Wire Size OK
LP-6 to LP-7	8	60	1	0.50	0	0.00	0	0.00	0	0.00	0	0.00	1.00	0.000809	0.09708	2.14	Wire Size OK
LP-7 to LP-8	8	60	1	0.50	0	0.00	0	0.00	0	0.00	0	0.00	0.50	0.000809	0.04854	2.19	Wire Size OK
	8	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0.00	0	0	2.19	Wire Size OK

Allowable Voltage Drop Not Exceeded, Circuit Is Good. 2.19

Figure 4-16. Sample Voltage Drop Calculation Spreadsheet

The conductor resistance per foot (R) is a function of the conductor size and material. Standard resistance values for various types and sizes of conductors can be found in the NEC. The designer may be asked to oversize conductors to accommodate future system expansion. This should be coordinated with the SSL District Engineer.

4.8.3 Ampacity

In addition to determining conductor sizes based on voltage drop calculations, the lighting designer must verify that the ampacity of the individual conductor is not exceeded. This is true for conductors of branch circuits and service feeder conductors.

The ampacity of a conductor is a function of its wire gauge, ambient temperature, and number of conductors in a bundle. Each conductor, its insulation and jacket have a rating for operating under certain ambient temperatures. As current flows within a conductor, it produces heat. The current carrying conductors must be sized to sufficiently dissipate that heat. Failure to properly size conductors as to not

exceed the conductor's ampacity can result in cable failure or fire. Ampacity values for various types of insulated conductors in conduits are defined in the NEC Section 310.15.

4.8.4 Grounding and Bonding

To form a continuously grounded system, mechanically and electrically bond all metallic conduits, metal poles, grounding wire, metal pull boxes, metallic pull box covers, and panels.

Ground rods are installed for all light poles and service cabinets per Standard Drawings P-660 and P-671.

All rigid steel conduit ends that terminate at the same location should be bonded together. Bond the copper grounding electrode conductor between the metal poles to the grounding rod at each foundation.

Bonding of light poles must follow NEC Section 410.30B requirements.

For all ground and bond wires, use City approved stranded conductors.

4.8.5 Existing Direct Buried Cable

Some older lighting systems that are still in place today use direct buried cables that may also run through old, abandoned gas and water lines. These systems are predominantly within the Downtown core. The City replaces these direct buried installations through the various Public Works and Capital Improvement projects.

Lighting design needs to account for connection of the existing direct buried systems that will remain to the new wiring system. Research and understanding of older record drawings will be required and coordinated with the SSL District Engineers and utility provider for the area. The actual tie-in should be coordinated with City Maintenance staff through the SSL District Engineer. Always provide a note to coordinate tie-in with City staff on street lighting plans.

4.9 SERVICE PANELS

PBOT illumination systems are flat rated with the local utilities. The typical pole and base mounted service panels are designed without meter bases. In rare circumstances electrical service for illumination requires a meter. If the designer runs into this circumstance, coordinate the type of service panel to specify with the SSL District Engineer.

The type of service panel depends on the following:

- Type of circuits to be fed
- Number of circuits
- Circuit breaker size
- The need for contactors

Pole mounted cabinets can be fed from overhead or underground feeds. Underground feeds are limited to poles that are of sufficient diameter to allow conduits to be fed into the pole and directly into the service cabinets to isolate the unfused power. It is important to ensure pole mounted service cabinets allow for conduit paths that do not exceed the bend radii of conductors. Figure 4-17 is taken from PBOT Standard Drawing P-670 showing service feeds for pole mounted panels. Orient pole mounted cabinets such that they do not protrude into the sidewalk. Due to their small diameters, new pole mounted service panels are no longer installed on post top street light poles.

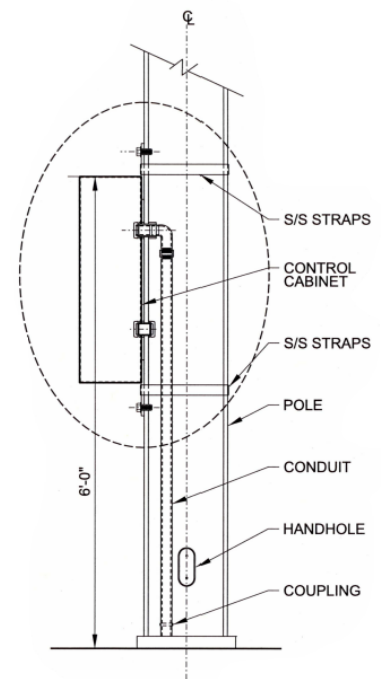


Figure 4-17. Pole Mounted Service Panel

4.9.1 Service Panel Type

Type "A"

Type "A" service panels are pole mounted and typically used for powering streetlights. The service panel per P-671 should be specified. The panel contains a test switch and space for two circuit breakers. The panel measures 12"H x 8"W x 6"D.

Type "B"

Type "B" service panels per P-671 are rarely used for new installations but may be considered when additional breakers are needed. These panels are pole mounted and at a minimum include a test switch, 30 Amp contactors, one main breaker, one photo control breaker and three branch breakers. The panel measures 24"H x 12"W x 8"D.

Type “C”

When additional breakers are needed or where overhead power feeds are infeasible, a Type “C” street lighting service panel per P-671 may be considered. This panel is base mounted with a test switch, 30 Amp contactors, a main breaker, photo control breaker and capacity for up to up to fifteen additional 1-pole or up to seven 2-pole branch breakers. The panel measures 43”H x 16”W x 8 3/4”D.

4.9.2 Breaker Sizing

Circuit breakers should be sized to ensure the ampacity of the current carrying conductors is not exceeded.

Main Breaker

The Main circuit breaker for the typical 120/240VAC electrical service panels are 240VAC double-pole. Circuit breakers for feeder conductors serving lighting circuits are considered continuous loads per the NEC Article 100. Breakers for feeder conductors serving only continuous loads will be rated for 125% of the continuous load. If both continuous and non-continuous loads are present within the service panel, the breaker is sized for the noncontinuous load plus 125% of the continuous load. These requirements are defined per the NEC Section 215.2(A)(1)(a). The latter condition is not typical for City lighting service panels.

Branch Breaker

Lighting circuits are considered continuous loads per the NEC Article 100. Breakers for branch circuits feeding only lighting circuits will be rated for 125% of the continuous load.

If both continuous and non-continuous loads are present on a circuit, the breaker is sized for the noncontinuous load plus 125% of the continuous load. These requirements are defined per the NEC Section 210.19(A)(1)(a). The latter condition is not typical for City lighting circuits. Branch circuit breakers can be 120VAC single-pole or 240VAC double-pole.

4.9.3 Lighting Control

Lighting circuits are typically controlled through contactors activated by remotely located photo electric cell activation. Contactors in use by the City are 30 Amp, three pole. The City will typically locate the photocell on the pole closest to the service panel.

For joint use small cell/light poles, streetlight only poles with overhead power feeds, and utility pole mounted luminaires, photocells are mounted on the luminaire.

4.10 SERVICE PANEL LOCATION

Several elements influence service panel location:

- System Expansion Potential – Locate panels where they can be utilized to meet current needs and potential expansion of the system as additional development occurs.
- Power Service:
 - Location – Utilities allow for up to 50-foot distance between the power source and utility junction box. PBOT will want to limit the amount of unfused power that is running underground.
 - Availability – Is power available where it's needed and at the correct voltage? City illumination systems can typically connect to 120/240 VAC or 120/208 VAC systems, although the latter is least desirable.
- Service Conductor Voltage Drop – Locate panels to minimize voltage drop between the service panel and utility junction box.
- Branch Circuit Design – The length and number of branch circuits may dictate the best panel location.

4.11 UTILITIES (POWER SOURCES)

Commercial power is used to power all electrical installations. Contractors need to obtain an electrical permit from the Bureau of Development Services if new service cabinets are to be installed and connected to a utility power source. For streetlight only poles connected to a transformer via overhead connection, a permit from the Bureau of Development Services is not required. When installing a new lighting system, the lighting designer should work with the local utility (PGE or PP&L) early in the design to determine the nearest location from where to draw power. Power is typically fed directly from a transformer or spliced mid-span from a secondary overhead power line. Except for unique applications identified by the SSL District Engineer, City owned and maintained lighting systems are not metered and are billed at a flat rate with both utilities.

Street lighting service typically requires commercial power of 120/240 VAC. Designer should investigate what type of power is available and the location of the power source. Some projects, such as those with tunnel lighting, may require higher voltage. Utility providers, depending on the location and provider, may have 120/208 VAC, 277/ 480 VAC, or higher power. If the existing power source cannot provide the power required or needs modifications to work, all stakeholders including the utility company must coordinate to resolve these issues.

For lighting installations, unfused power is required to enter the pole or service panel separated from fused circuits. At some point, power needs to transfer from utility jurisdiction to City jurisdiction. This is known as the demarcation point. For overhead power feeds, this point is typically at the weather head.

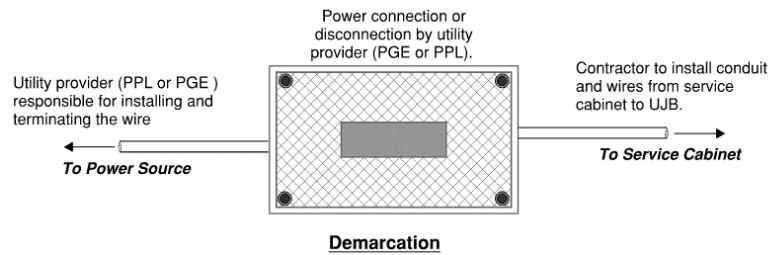


Figure 4-18. Demarcation Junction Box

For underground feeds, the utility junction box serves as the demarcation point. See Section 4.7.2 for additional information on Utility Junction Boxes. Since unfused power is present, the utility is required to connect and disconnect the city lighting system. See Figure 4-18.

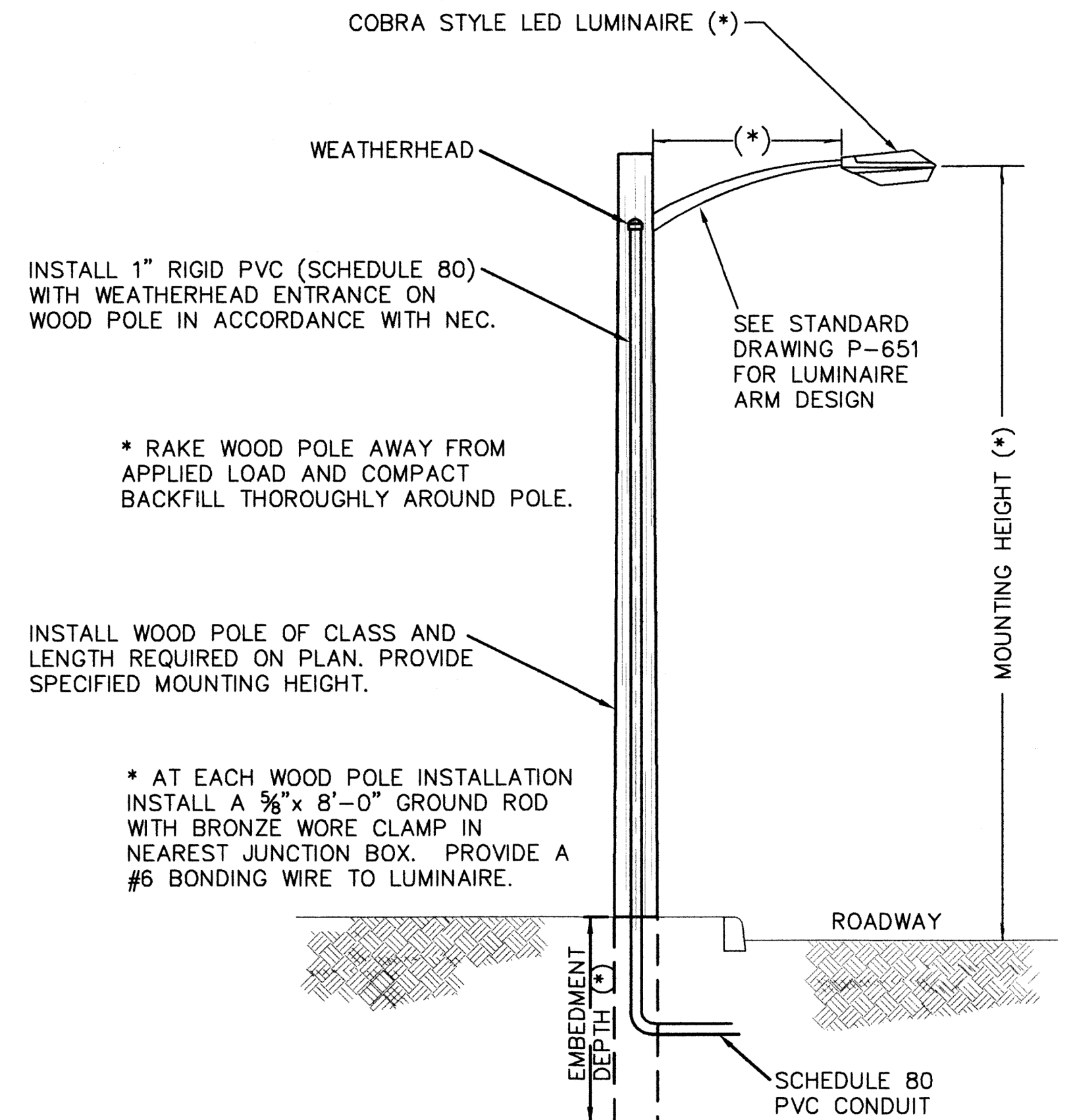
The conduit and wiring from the power source to the service panel (service conduits and wiring) are designed and installed according to the power company's specifications. The plan sheets should provide reference to follow the appropriate utilities standards.

Appendix A

APPENDIX A - SAMPLE PLANS




The following sample plans are from various projects and provide guidance on the type of information to provide, such as appropriate sheet layout, format, and scaling (also covered in Section 1.4).

1. ALL STREET LIGHTING WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE 2010 CITY OF PORTLAND STANDARD SPECIFICATIONS FOR CONSTRUCTION EXCEPT AS NOTED ON THESE PLANS OR IN THE PROJECT SPECIAL PROVISIONS.
2. CONTRACTOR SHALL CONTACT NELSON CHI, CITY OF PORTLAND SIGNALS, STREET LIGHTING, AND ITS (503-823-2604) PRIOR TO CONSTRUCTION FOR INFORMATION CONCERNING MATERIAL SUBMITTALS, AND INSTALLATION OF BURIED MATERIALS SUCH AS STREET LIGHT CONDUITS.
3. CONTRACTOR SHALL CONTACT THE CITY OF PORTLAND STREET LIGHTING INSPECTOR (SSLINSPECTOR@PORTLANDOREGON.GOV) TWO WORKING DAYS PRIOR TO STARTING ANY STREET LIGHTING WORK AND PRIOR TO CONCEALING ANY MATERIALS THAT WILL BE BURIED IN SOIL, CONCRETE, OR CDF.
4. STREET LIGHTING POLES SHALL BE INSTALLED BEHIND FACE OF CURB AS INDICATED IN THE STREET LIGHT POLE SCHEDULE.
5. PROVIDE ONE POLYESTER PULL TAPE RATED AT 1250 LBS, AND ONE ADDITIONAL YELLOW #12 AWG WIRE IN ALL CONDUITS. THIS CONDUCTOR WILL BE USED AS A "TRACER" WIRE FOR FUTURE LOCATING OF THE UNDERGROUND SYSTEM.
6. CONTRACTOR IS RESPONSIBLE FOR FURNISHING AND INSTALLING ALL LIGHTING MATERIALS EXCEPT AS NOTED ON PLANS.
7. CONTRACTOR SHALL OBTAIN AN ELECTRICAL PERMIT FROM THE BUREAU OF DEVELOPMENT SERVICES FOR NEW SERVICE INSTALLATION.
8. CONTRACTOR IS RESPONSIBLE FOR MAINTAINING ADEQUATE LIGHTING OF WORK ZONE AREA.
9. CITY RESERVES THE RIGHT TO REQUIRE THE CONTRACTOR TO PROVIDE ADDITIONAL TEMPORARY LIGHTING IF ADDITIONAL LIGHTING IS DETERMINED TO BE NECESSARY TO ADEQUATELY ILLUMINATE THE WORK ZONE AREA, OR ADDITIONAL AREAS IN WHICH LIGHTING HAS BEEN AFFECTED BY THE WORK ZONE AREA.
10. NEW TWIN ORNAMENTAL STREET LIGHT POLE SHALL BE FACTORY PRIMED WITH WASSER FERROX-B AND FIELD PAINTED WITH A TOP COAT OF WASSER MC-LUSTER, PORTLAND GREEN (W211.0227) AND TRIMMED WITH MC-LUSTER GOLD (W211.0226).
11. POURED IN PLACE FOUNDATIONS SHALL BE POURED AGAINST NATIVE EARTH CONDITIONS. IF THE FOUNDATION IS OVER EXCAVATED, THE ENTIRE AREA OF OVER EXCAVATION SHALL BE BACKFILLED WITH CONCRETE WHEN THE FOUNDATION IS POURED. CYLINDRICAL TYPE FRAMING WILL NOT BE ACCEPTED UNLESS UNSTABLE EARTH CONDITIONS REQUIRE IT, AND THEN ONLY AT THE DISCRETION OF THE ENGINEER OR INSPECTOR. WHEN CYLINDRICAL FRAMING IS REQUIRED, THE FRAMING SHALL BE CONSTRUCTED FROM A SECTION OF STEEL CULVERT OR APPROVED EQUIVALENT. NO PAPER SONOTUBE PRODUCTS WILL BE ACCEPTED FOR USE ON FOUNDATIONS FOR STREET LIGHTING PROJECTS.
12. A MINIMUM OF 25 FT SPACING IS TO BE MAINTAINED BETWEEN STREET LIGHTS AND TREES UNLESS APPROVED OTHERWISE BY THE CITY STREET LIGHTING SECTION.
13. CONTRACTOR SHALL COORDINATE WITH ENGINEER OF RECORD (EOR) AND SUPPLY AS-BUILT DRAWINGS IN CAD FORMAT (.DWG OR .DGN) AND HARD COPY AT THE COMPLETION OF THE PROJECT
14. LOCATION OF THE EXISTING UTILITIES ARE APPROXIMATE. EXACT LOCATIONS SHALL BE VERIFIED PRIOR TO EXCAVATION.
15. ALL STREET LIGHTING EQUIPMENT, CONDUITS AND FOUNDATIONS SHALL BE LOCATED IN THE STREET RIGHT-OF-WAY.
17. ALL STREET LIGHTING WORK MUST BE PERFORMED BY A LICENSED ELECTRICAL CONTRACTOR.
18. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL COORDINATION WITH UTILITY COMPANY AND ASSOCIATED COSTS TO COMPLETE THE LIGHTING SERVICE CONNECTION. THE PGE WORK ORDER NUMBER FOR THIS PROJECT IS M2922465.
19. SEE STANDARD DRAWINGS:
 - P-632: PULL BOX TYPE A & B DETAILS
 - P-652: STREET LIGHTING TWIN ORNAMENTAL POLE DETAILS
 - P-655: STREET LIGHTING PHOTOELECTRIC CONTROL ORNAMENTAL POLE DETAILS
 - P-660: STREET LIGHTING STANDARD STREET LIGHT STANDARD POLE FOOTING
 - P-671: STREET LIGHTING SERVICE CABINET DETAILS
 - P-680: STREET LIGHTING POLE WIRING DIAGRAMS





NEW TYPE "C" ROADWAY LIGHTING PANEL SCHEMATIC










NW FLANDERS ST, STA. 11+04.80 (20.5' RT)

				DESIGNED BY DMB	DATE APPROVED		APPROVALS:		PORTLAND BUREAU OF TRANSPORTATION		FRONTAGE IMPROVEMENT FOR NW 6TH AVE & NW FLANDERS ST		PBOT JOB NO. TH1032
CONSTRUCTED BY _____				CAD BY REH	DN. ENGINEER		 07/13/21 PBOT PRINCIPAL ENGINEER REG. PROF. ENGR. 53882PE		JO ANN HARDESTY COMMISSIONER				SHEET NO.
PROJECT COMPLETED _____				CHECKED BY DMB	PBOT REVIEWER		 PBOT CITY ENGINEER REG. PROF. ENGR. 51538PE		STEVE TOWNSEN, P.E. CITY ENGINEER				IL-01
MAP CORRECTED BY _____													10 OF 11
CHECKED BY _____												ILLUMINATION DETAILS	
NO.	DATE	DESCRIPTION	APPD.										
REVISIONS													
FINAL MAP DATA													

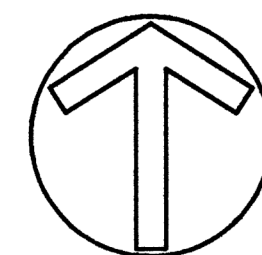
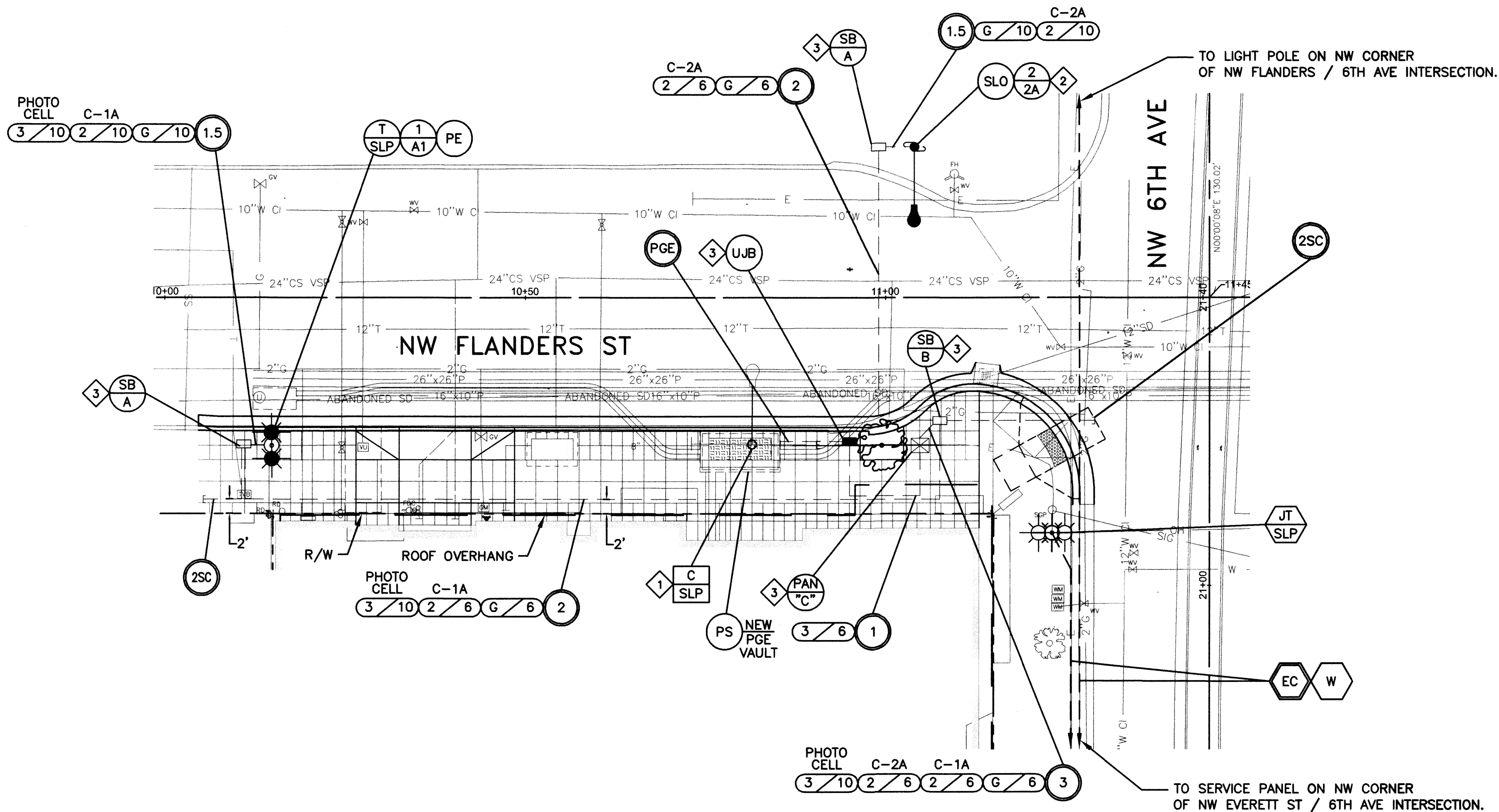
 — EXISTING ELECTRICAL CONDUIT.
 — EXISTING WIRING.
 — EXISTING JOINT USE CATENARY / TWIN ORNAMENTAL STREET LIGHT POLE.
 — INSTALL SERVICE PANEL (S) TYPE ON CIRCUIT (P) TO SERVICE PANEL (Z).
 SERVICE PANEL (Z):
 A = NEW PANEL LOCATED ON NW FLANDERS ST
 AT STA 10+90 RT.

- UJB — INSTALL NEW UTILITY JUNCTION BOX FOR SERVICE CONNECTION PER PGE REQUIREMENTS.
- (S) — INSTALL (S) INCH CONDUIT.
- (S)SC — INSTALL (S) INCH DIAMETER CONDUIT STUB FOR FUTURE USE (CAP ENDS).
- PGE — INSTALL ELECTRICAL CONDUIT PER PGE REQUIREMENTS. COORDINATE WORK WITH PGE.
- (S)(A)(Z) — NEW STREET LIGHT POLE NUMBER (S) CONNECTED TO LIGHTING CIRCUIT (A) FROM SERVICE PANEL (Z).
- SLO — INSTALL CLASS 4 WOOD STREET LIGHT POLE.
- T
SLP — INSTALL TWIN ORNAMENTAL STYLE STREET LIGHT POLE ON NEW FOUNDATION.
- SB
(T) — INSTALL NEW TYPE (T) SIDEWALK PULL BOX.
- PE — INSTALL PHOTOCELL.
- PS — POWER SOURCE.

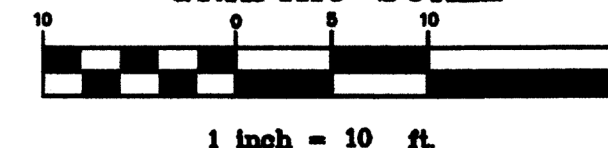
-  — INSTALL ONE (G) AWG GROUNDWIRE.
- C-(A)(Z) — INSTALL (N)-NO. (G) AWG XHHW CIRCUIT (A),
 — CONDUCTORS FROM SERVICE PANEL (Z).

- | | |
|--|---|
|  | EXISTING COBRAHEAD STREET LIGHT POLE |
|  | NEW WOOD COBRAHEAD STREET LIGHT POLE |
|  | EXISTING JOINT USE CATENARY / TWIN ORNAMENTAL STREET LIGHT POLE |
|  | NEW TWIN ORNAMENTAL STREET LIGHT POLE |
|  | NEW SIDEWALK PULL BOX |
|  | NEW UTILITY JUNCTION BOX PER PP&L REQUIREMENT |
|  | NEW SERVICE CABINET |
|  | EXISTING STREET LIGHT CONDUIT |
|  | NEW STREET LIGHT CONDUIT |

- 1 CONTRACTOR TO CONTACT NELSON CHI, (503-823-2604)
CITY OF PORTLAND SIGNALS, STREET LIGHTING, AND ITS TO
INITIATE WORK ORDER FOR REMOVAL OF EXISTING OVERHEAD
POWER FED COBRA HEAD STREET LIGHT POLE.
- 2 BURIAL DEPTH OF POLE SHALL BE PER SPECIAL PROVISIONS
SECTION 00960.47.
- 3 CITY OF PORTLAND SIDEWALK PULL BOXES, UTILITY JUNCTION
BOX AND SERVICE CABINET LOCATIONS ARE SHOWN WITH
STATIONING AND OFFSET ON CIVIL PLAN AND PROFILE SHEET.



GRAPHIC SCALE

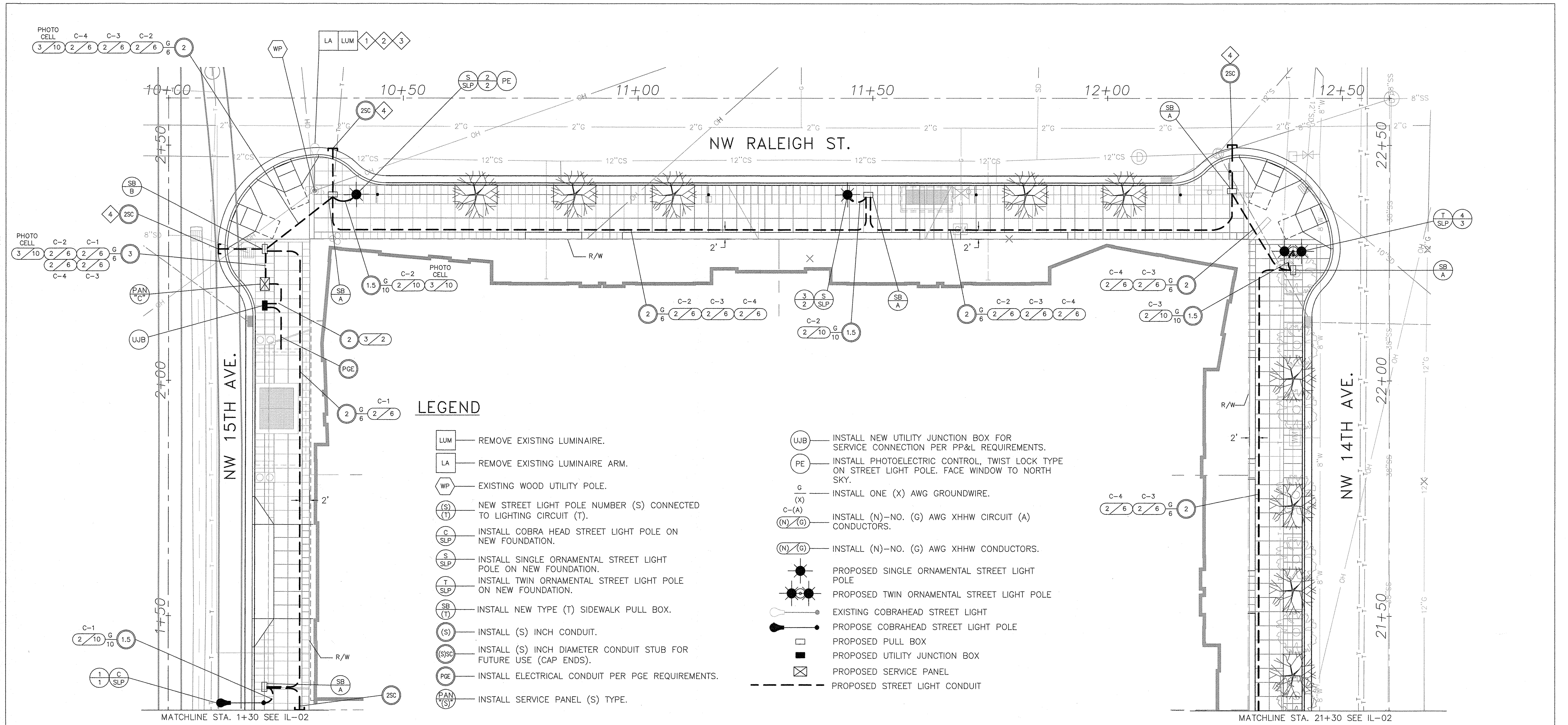


NEW STREET LIGHT POLE SCHEDULE								
POLE NO.	CIRCUIT NO.	STREET	STATION	OFFSET *	POLE TYPE	MOUNTING HEIGHT	ARM LENGTH	LUMINAIRE
1	1A	NW FLANDERS ST	10+14.8	20.5' RT	TWIN ORNAMENTAL	—	—	TWO NEW TRADITIONAL ORNAMENTAL LUMINAIRES
2	1B	NW FLANDERS ST	11+04.0	20.9' LT	WOOD	30'	4'	LED COBRA HEAD STYLE, 6,425 LUMEN OUTPUT, 3000K TYPE 2 DISTRIBUTION, OR APPROVED EQUIV.

* OFFSET IS MEASURED FROM CENTERLINE TO CENTER OF POLE.

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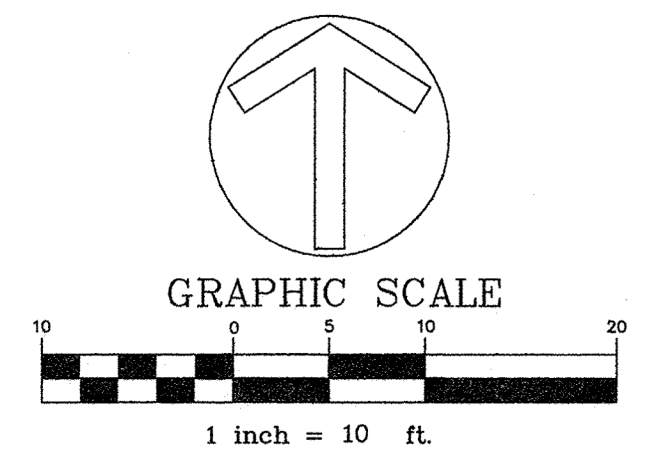


SHEET NOTES

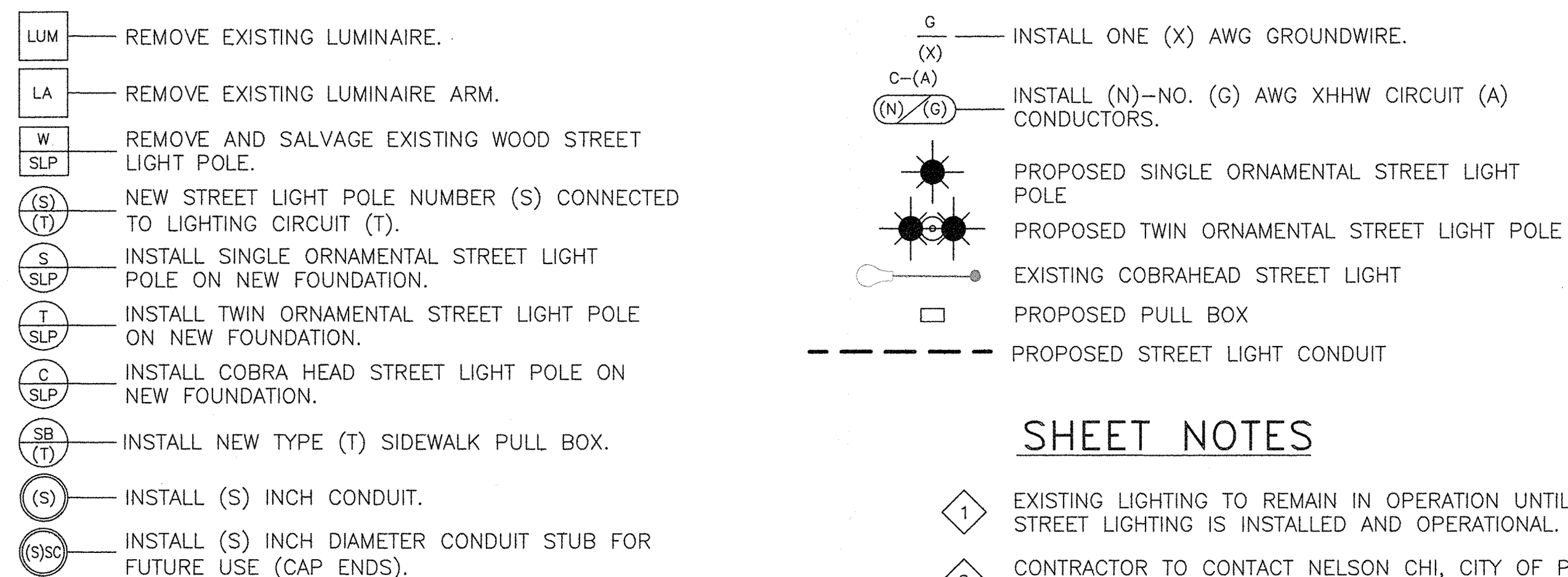
- 1 EXISTING LIGHTING TO REMAIN IN OPERATION UNTIL NEW STREET LIGHTING IS INSTALLED AND OPERATIONAL.
- 2 CONTRACTOR TO CONTACT NELSON CHI, CITY OF PORTLAND (503) 823-2604, TO INITIATE PGE WORK ORDER FOR DISCONNECT OF STREET LIGHT SERVICE.
- 3 CONTRACTOR TO CONTACT DAN PASSMORE, CITY OF PORTLAND (503) 823-1725, TO COORDINATE SALVAGE OF LED FIXTURE AND LUMINAIRE ARM.
- 4 EXTEND STUBBED CONDUIT 18" PAST FACE OF CURB.

STREET LIGHT POLE SCHEDULE									
POLE NO.	CIRCUIT NO.	STREET	STATION	OFFSET	POLE TYPE	LUMINAIRE WATTAGE	LUMINAIRE ARM	MOUNTING HEIGHT	LUMINAIRE TYPE
1	1	NW 15TH AVE	1+31	2.5*	STEEL, SEE GENERAL NOTE #12, SHEET IL-3 FOR DETAILS	63W	6	30FT	EC3-10M-MV-NW-2-GY-530-SC-WL (PCR SHORTING CAP AND UTILITY VOLTAGE LABEL)
2	2	NW RALEIGH ST	10+40.0	20.5**	SINGLE ORNAMENTAL	42W	N/A	SEE STANDARD DETAILS	ONE NEW ORNAMENTAL LED LUMINAIRE AMERLUX, HYAECOPS03LS
3	2	NW RALEIGH ST	11+44.5	2.5*	SINGLE ORNAMENTAL	42W	N/A	SEE STANDARD DETAILS	ONE NEW ORNAMENTAL LED LUMINAIRE AMERLUX, HYAECOPS03LS
4	3	NW 14TH AVE.	22+27.5	20.5**	TWIN ORNAMENTAL	42W/42W	N/A	SEE STANDARD DETAILS	TWO NEW ORNAMENTAL LED LUMINAIRES AMERLUX, HYAECOPS03LT-LA

* OFFSET IS MEASURED FROM FACE OF CURB TO CENTER OF POLE.
** OFFSET IS MEASURED FROM CENTERLINE OF ROADWAY TO CENTER OF POLE.



CONSTRUCTED BY _____		DESIGNED BY MTL		DATE APPROVED		<div>APPROVALS:</div> <div> PORT PRINCIPAL ENGINEER 2/23/17 REG. PROF. ENGR. 53882PE</div> <div> PORT CITY ENGINEER REG. PROF. ENGR. 51538PE</div>	<div>PORTLAND BUREAU OF TRANSPORTATION</div> <div>STEVE NOVICK COMMISSIONER</div> <div>STEVE TOWNSEN, P.E. CITY ENGINEER</div>	<div>BROADSTONE PEARL</div> <div>NW 15TH AVE, NW RALEIGH ST, NW 14TH AVE, AND NW QUIMBY ST</div> <div>ILLUMINATION PLAN</div>	<div>PBOT JOB NO.</div> <div>TH0274</div> <div>SHEET NO.</div> <div>IL-1</div> <div>12 OF 14</div>				
PROJECT COMPLETED _____		CAD BY GTE		DIV. ENGINEER									
MAP CORRECTED BY _____		CHECKED BY DMB		PBOT REVIEWER									
CHECKED BY _____													
NO. DATE DESCRIPTION APPD.		FINAL MAP DATA											
REVISIONS													

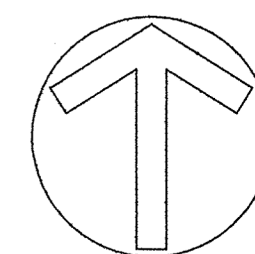
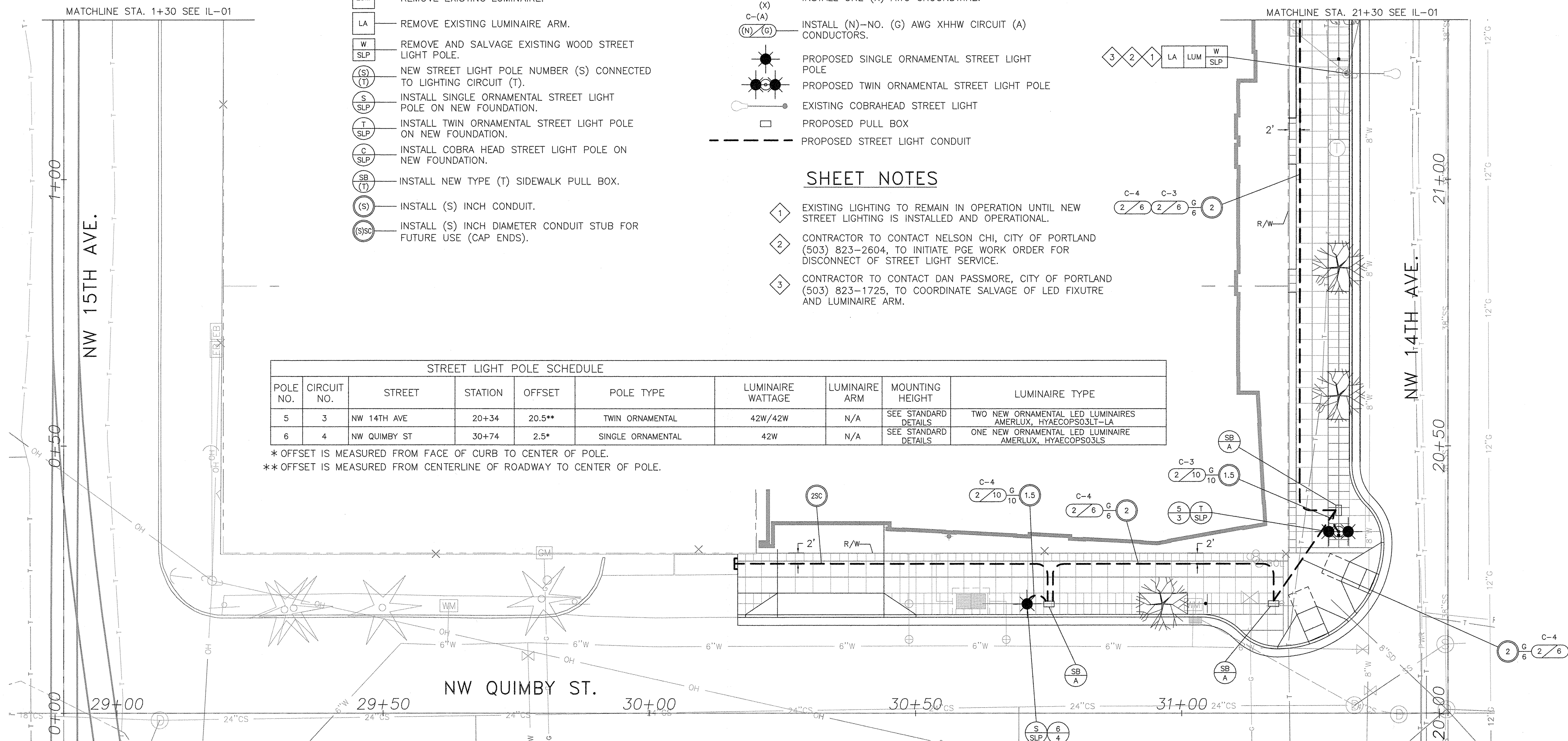


SHEET NOTES

- 1 EXISTING LIGHTING TO REMAIN IN OPERATION UNTIL NEW STREET LIGHTING IS INSTALLED AND OPERATIONAL.
- 2 CONTRACTOR TO CONTACT NELSON CHI, CITY OF PORTLAND (503) 823-2604, TO INITIATE PGE WORK ORDER FOR DISCONNECT OF STREET LIGHT SERVICE.
- 3 CONTRACTOR TO CONTACT DAN PASSMORE, CITY OF PORTLAND (503) 823-1725, TO COORDINATE SALVAGE OF LED FIXTURE AND LUMINAIRE ARM.

STREET LIGHT POLE SCHEDULE									
POLE NO.	CIRCUIT NO.	STREET	STATION	OFFSET	POLE TYPE	LUMINAIRE WATTAGE	LUMINAIRE ARM	MOUNTING HEIGHT	LUMINAIRE TYPE
5	3	NW 14TH AVE	20+34	20.5**	TWIN ORNAMENTAL	42W/42W	N/A	SEE STANDARD DETAILS	TWO NEW ORNAMENTAL LED LUMINAIRES AMERLUX, HYAECOPS03T-LA
6	4	NW QUIMBY ST	30+74	2.5*	SINGLE ORNAMENTAL	42W	N/A	SEE STANDARD DETAILS	ONE NEW ORNAMENTAL LED LUMINAIRE AMERLUX, HYAECOPS03LS

* OFFSET IS MEASURED FROM FACE OF CURB TO CENTER OF POLE.
** OFFSET IS MEASURED FROM CENTERLINE OF ROADWAY TO CENTER OF POLE.



GRAPHIC SCALE



1 inch = 10 ft.

					CONSTRUCTED BY _____
					PROJECT COMPLETED _____
					MAP CORRECTED BY _____
					CHECKED BY _____
NO.	DATE	DESCRIPTION			APPD.
REVISIONS					FINAL MAP DATA

DESIGNED BY MTL	DATE APPROVED
CAD BY GTE	DIV. ENGINEER
CHECKED BY DMB	PBOT REVIEWER



APPROVALS:

 PETER PRINCIPAL ENGINEER	2/23/17 REG. PROF. ENGR. 53882P
 STEVE TORRANCE PBOT CITY ENGINEER	REG. PROF. ENGR. 51538P

PORTLAND
BUREAU OF TRANSPORTATION

STEVE NOVICK COMMISSIONER
STEVE TOWNSEN, P.E. CITY ENGINEER

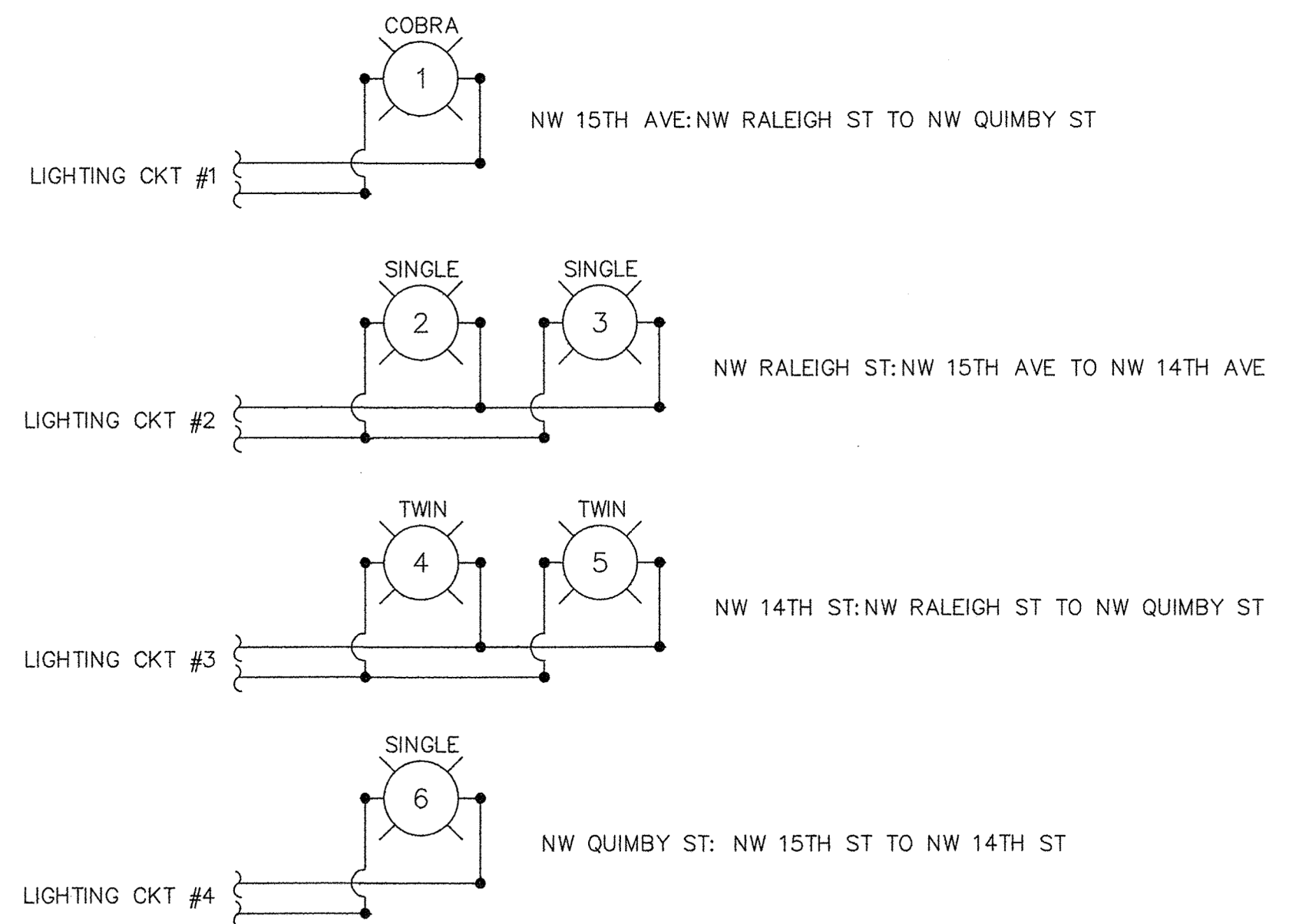
BROADSTONE PEARL
NW 15TH AVE, NW RALEIGH ST,
NW 14TH AVE, AND NW QUIMBY ST

ILLUMINATION PLAN

PBOT JOB NO.
TH0274

SHEET NO.
IL-2
13 OF **14**

1. ALL STREET LIGHTING WORK SHALL BE PERFORMED WITH THE 2010 CITY OF PORTLAND STANDARD SPECIFICATIONS FOR CONSTRUCTION EXCEPT AS NOTED ON THESE PLANS OR IN THE PROJECT SPECIAL PROVISIONS.
2. CONTRACTOR SHALL CONTACT NELSON CHI, CITY OF PORTLAND SIGNALS AND STREET LIGHTING DIVISION (503-823-2604) PRIOR TO CONSTRUCTION FOR INFORMATION CONCERNING MATERIAL SUBMITTALS, AND INSTALLATION OF BURIED MATERIALS SUCH AS STREET LIGHT CONDUITS.
3. CONTRACTOR TO CONTACT DALE KURKINEN, CITY OF PORTLAND STREET LIGHTING INSPECTOR (503-823-5217 OFFICE, 503-823-8889 CELL) 48 HOURS PRIOR TO STARTING ANY STREET LIGHTING WORK AND PRIOR TO CONCEALING ANY MATERIALS THAT WILL BE BURIED IN SOIL, CONCRETE, OR CDF.
4. STREET LIGHT POLES SHALL BE INSTALLED BEHIND FACE OF CURB AS INDICATED IN THE STREET LIGHT POLE SCHEDULE ON SHEETS IL-1 AND IL-2.
5. PROVIDE ONE POLYESTER PULL TAPE RATED AT 1250 LBS, AND ONE ADDITIONAL YELLOW #12 AWG WIRE IN ALL CONDUITS. THIS CONDUCTOR WILL BE USED AS A "TRACER" WIRE FOR FUTURE LOCATING OF THE UNDERGROUND SYSTEM.
6. CONTRACTOR IS RESPONSIBLE FOR FURNISHING AND INSTALLING ALL LIGHTING MATERIALS EXCEPT AS NOTED ON PLANS.
7. CONTRACTOR SHALL BE RESPONSIBLE FOR COST TO REPAIR OR REPLACE ANY EXISTING STREET LIGHTING EQUIPMENT LOST OR DAMAGED AS A RESULT OF THIS PROJECT.
8. CONTRACTOR SHALL BE RESPONSIBLE FOR ADJUSTING STREET LIGHTS AND PULL BOXES TO MATCH NEW SIDEWALK GRADE.
9. EXISTING STREET LIGHT CONDUIT IS APPROXIMATE. EXACT LOCATION SHALL BE FIELD VERIFIED PRIOR TO START WORK.
10. CONTRACTOR IS RESPONSIBLE FOR MAINTAINING ADEQUATE LIGHTING OF WORK ZONE AREA.
11. CITY RESERVES THE RIGHT TO REQUIRE THE CONTRACTOR TO PROVIDE ADDITIONAL TEMPORARY LIGHTING IF ADDITIONAL LIGHTING IS DETERMINED TO BE NECESSARY TO ADEQUATELY ILLUMINATE THE WORK ZONE AREA, OR ADDITIONAL AREAS IN WHICH LIGHTING HAS BEEN AFFECTED BY THE WORK ZONE AREA.
12. ALL COBRA HEAD STREET LIGHT POLES SHALL BE VALMONT DS-32 SERIES AND ARE TO BE FACTORY PRIMERED WITH WASSER FERROX-B, AND PAINTED WITH A TOP COAT OF WASSER MC-LUSTER. LIGHT POLES SHALL BE PAINTED PORTLAND GREEN (W211.0227).
13. ALL ORNAMENTAL STREET LIGHT POLES WITHIN THE PROJECT LIMITS ARE TO BE FACTORY PRIMERED WITH WASSER FERROX-B, AND PAINTED WITH A TOP COAT OF WASSER MC-LUSTER. LIGHT POLES SHALL BE PAINTED PORTLAND GREEN (W211.0227). TWIN ORNAMENTAL POLES SHALL BE TRIMMED WITH GOLD (W211.0226).
14. POURED IN PLACE FOUNDATIONS SHALL BE POURED AGAINST NATIVE EARTH CONDITIONS. IF THE FOUNDATION IS OVER EXCAVATED, THE ENTIRE AREA OF OVER EXCAVATION SHALL BE BACKFILLED WITH CONCRETE WHEN THE FOUNDATION IS POURED. CYLINDRICAL TYPE FRAMING WILL NOT BE ACCEPTED UNLESS UNSTABLE EARTH CONDITIONS REQUIRE IT, AND THEN ONLY AT THE DISCRETION OF THE ENGINEER OR INSPECTOR. WHEN CYLINDRICAL FRAMING IS REQUIRED, THE FRAMING SHALL BE CONSTRUCTED FROM A SECTION OF STEEL CULVERT OR APPROVED EQUIVALENT. NO PAPER SONOTUBE PRODUCTS WILL BE ACCEPTED FOR USE ON FOUNDATIONS FOR STREET LIGHTING PROJECTS.
15. A MINIMUM OF 25 FT SPACING IS TO BE MAINTAINED BETWEEN STREET LIGHTS AND TREES UNLESS APPROVED OTHERWISE BY THE CITY STREET LIGHTING SECTION.
16. CONTRACTOR SHALL COORDINATE WITH DESIGN CONSULTANT TO SUBMIT AS-BUILT DRAWINGS IN CAD FORMAT (.DWG OR .DGN) AND HARD COPY AT THE COMPLETION OF THE PROJECT.
17. LOCATION OF THE EXISTING UTILITIES ARE APPROXIMATE. EXACT LOCATIONS SHALL BE VERIFIED PRIOR TO EXCAVATION.
18. ALL STREET LIGHTING EQUIPMENT, CONDUITS AND FOUNDATIONS SHALL BE LOCATED IN THE STREET RIGHT-OF-WAY.
19. ALL STREET LIGHTING WORK MUST BE PERFORMED BY A LICENSED ELECTRICAL CONTRACTOR.
20. CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATION WITH UTILITY COMPANY AND ASSOCIATED COSTS. CONTACT PGE SERVICE COORDINATORS AT 503-323-6700. PGE WORK REQUEST NUMBER M2261604.



(TYPE)
 — NEW STREET LIGHT POLE NO. (XX).

TYPE:

TWIN = TWIN ORNAMENTAL STREET LIGHT
 SINGLE = SINGLE ORNAMENTAL STREET LIGHT
 COBRA = COBRA HEAD STREET LIGHT POLE

FILE: IL-03.DWG Layout1 2/22/2017 4:42:31 PM - RICK

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FILE: 20267 - LIGHTING.DWG IL-1 10/19/2018 4:10:36 PM - ACARY

STREET LIGHTING LEGEND

- G** — INSTALL ONE (X) AWG GROUND WIRE
- C-(A)** — INSTALL (N)-NO. (G) AWG XHHW WIRES IN PANEL CIRCUIT NUMBER (A)
- (S)** — INSTALL (S) IN. DIAMETER ELECTRICAL CONDUIT
- (S)** — INSTALL STREET LIGHT POLE NUMBER (S) CONNECTED TO LIGHTING CIRCUIT (T)
- PAN (T)** — INSTALL STREET LIGHTING PANEL TYPE (T)
- SB (T)** — INSTALL TYPE (T) SIDEWALK PULL BOX
- Z SLP** — INSTALL BOTTLE NECK TYPE STREET LIGHT POLE ON NEW FOUNDATION
- (S)SC** — INSTALL (S) IN DIAMETER STUB-OUT CONDUIT
- (PGE)** — INSTALL CONDUIT AND WIRE PER PGE SPECIFICATION
- UJB** — INSTALL UTILITY JUNCTION BOX
- PE** — INSTALL PHOTOCONTROL ELECTRONIC RELAY
- (N)/(G)** — INSTALL (N) - NO. (G) AWG XHHW WIRE
- LED** — EXISTING LED LUMINAIRE AND ARM
- UP** — EXISTING UTILITY POLE
- UP** — EXISTING UTILITY POLE REMOVED BY OTHERS
- LED** — REMOVE EXISTING LED LUMINARIE AND ARM.
- W SLP** — REMOVE EXISTING WOOD STREET LIGHT POLE

CONSTRUCTION NOTES:

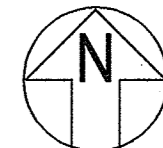
- 1 PGE WORK ORDER FOR SERVICE IS M2448485. CONNECT TO PGE POLE. COORDINATE INSTALLATION WITH LISA GUARNERO OF PGE (503-742-8299).
- 2 CONTACT CITY OF PORTLAND SIGNAL & STREET LIGHTING MAINTENANCE (503-823-6755) TO COORDINATE SALVAGING OF MATERIALS.
- 3 INSTALL CONDUIT STUB 18 INCHES PAST FACE OF CURB.

STREET LIGHT POLE SCHEDULE

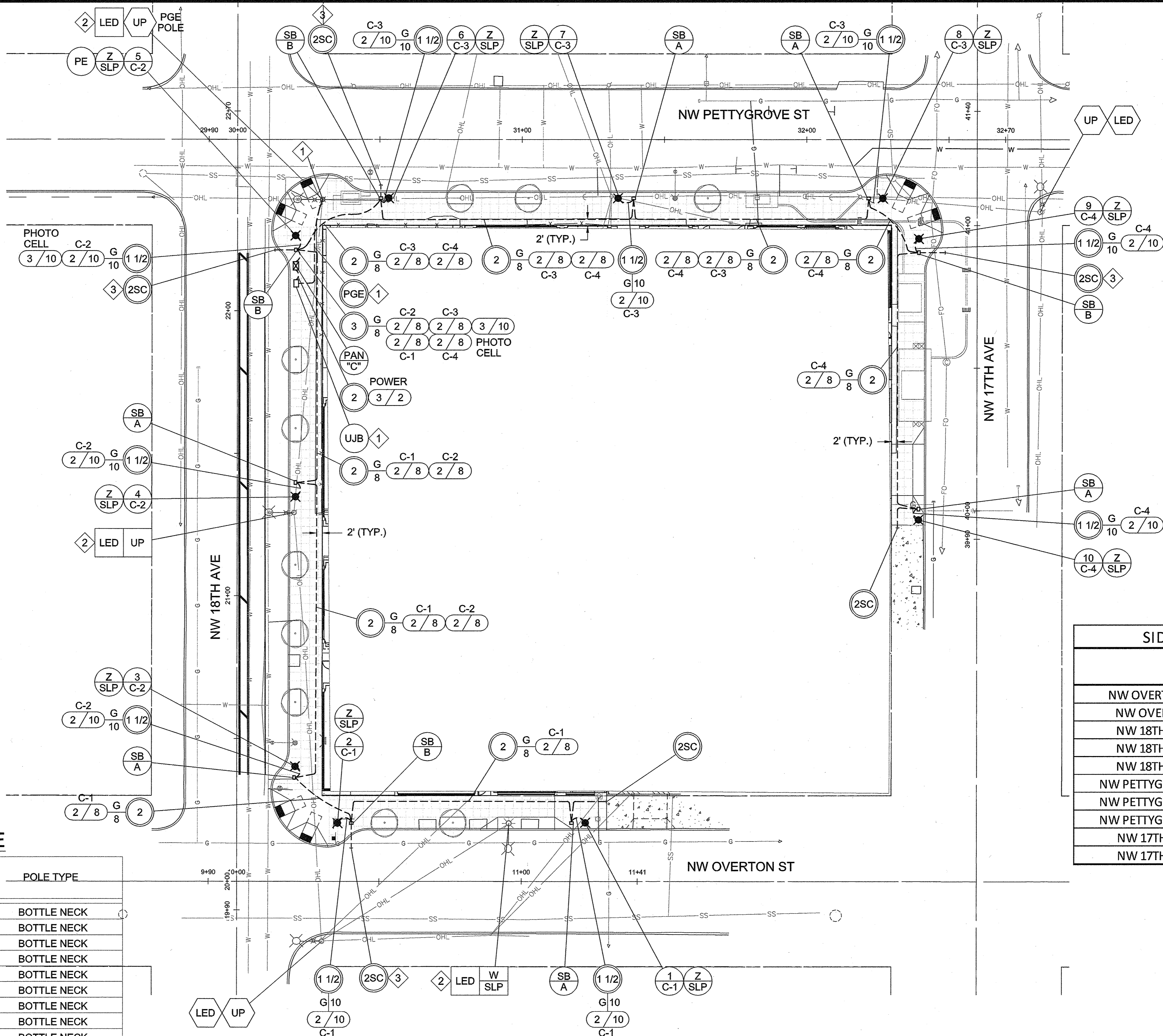
POLE NO.	CIRCUIT	STREET	STATION & OFFSET	LAMP	POLE TYPE
1	1	NW OVERTON ST	STA. 11+22.4, 20.5' LT	65W LED	BOTTLE NECK
2	1	NW OVERTON ST	STA. 10+35.0, 20.4' LT	65W LED	BOTTLE NECK
3	1	NW 18TH AVE	STA. 20+40.3, 20.5' RT	65W LED	BOTTLE NECK
4	2	NW 18TH AVE	STA. 21+35.0, 20.5' RT	65W LED	BOTTLE NECK
5	2	NW 18TH AVE	STA. 22+26.4, 20.5' RT	65W LED	BOTTLE NECK
6	3	NW PETTYGROVE ST	STA. 30+50.0, 20.5' RT	65W LED	BOTTLE NECK
7	3	NW PETTYGROVE ST	STA. 31+34.0, 20.5' RT	65W LED	BOTTLE NECK
8	3	NW PETTYGROVE ST	STA. 32+27.0, 20.5' RT	65W LED	BOTTLE NECK
9	4	NW 17TH AVE	STA. 40+85.4, 20.5' LT	65W LED	BOTTLE NECK
10	4	NW 17TH AVE	STA. 39+97.0, 20.5' LT	65W LED	BOTTLE NECK

SIDEWALK PULL BOX SCHEDULE

STATION	TYPE
NW OVERTON ST STA. 11+18.0, 20.5' LT	A
NW OVERTON STA. 10+40.3, 20.4' LT	B
NW 18TH AVE STA. 20+35.0, 20.2' RT	A
NW 18TH AVE STA. 21+40.0, 20.5' RT	A
NW 18TH AVE STA. 22+21.4, 20.5' RT	B
NW PETTYGROVE ST STA. 30+50.4, 20.0' RT	B
NW PETTYGROVE ST STA. 31+39.2, 20.5' RT	A
NW PETTYGROVE ST STA. 32+22.0, 20.0' RT	A
NW 17TH AVE STA. 40+90.0, 20.5' LT	B
NW 17TH AVE STA. 40+02.0, 20.0' LT	A



10' 0' 20' 40'
SCALE: 1" = 20'



NO.	DATE	DESCRIPTION	APPD.
REVISIONS			
FINAL MAP DATA			

DESIGNED BY JJW	DATE APPROVED
CAD BY AAC	SECTION ENGR
CHECKED BY HJS	PBOT REVIEWER 1/14



APPROVALS:
PRINCIPLE ENGINEER
REG. PROF. ENGR. 53382PE
PBOT CITY ENGINEER
REG. PROF. ENGR. 51538PE

PORTLAND
BUREAU OF TRANSPORTATION

CHOLE EUDALY
STEVE TOWNSEN, P.E.
COMMISSIONER
CITY ENGINEER

NW PETTYGROVE ST, NW 17TH ST,
NW OVERTON ST. & NW 18TH AVE

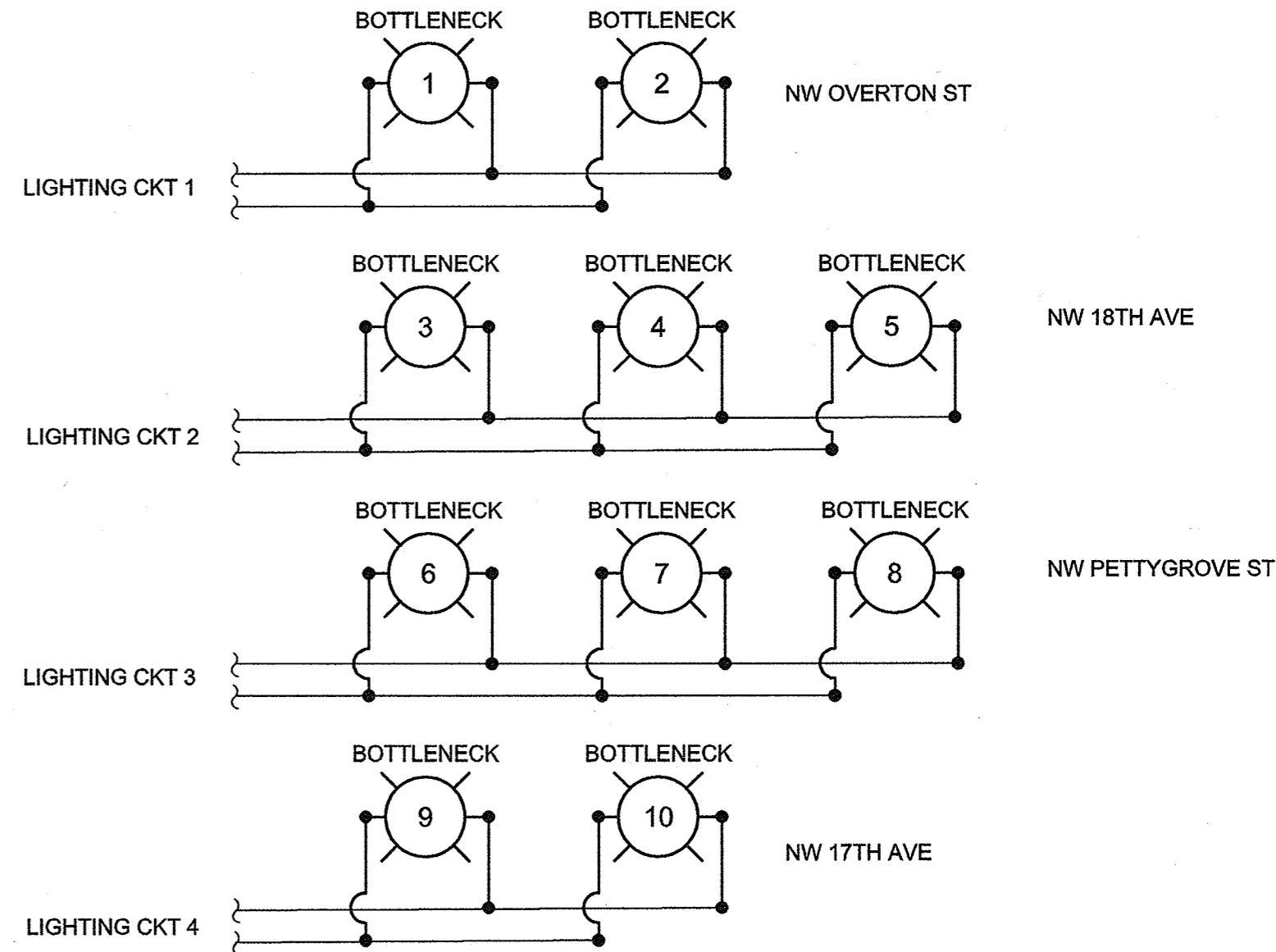
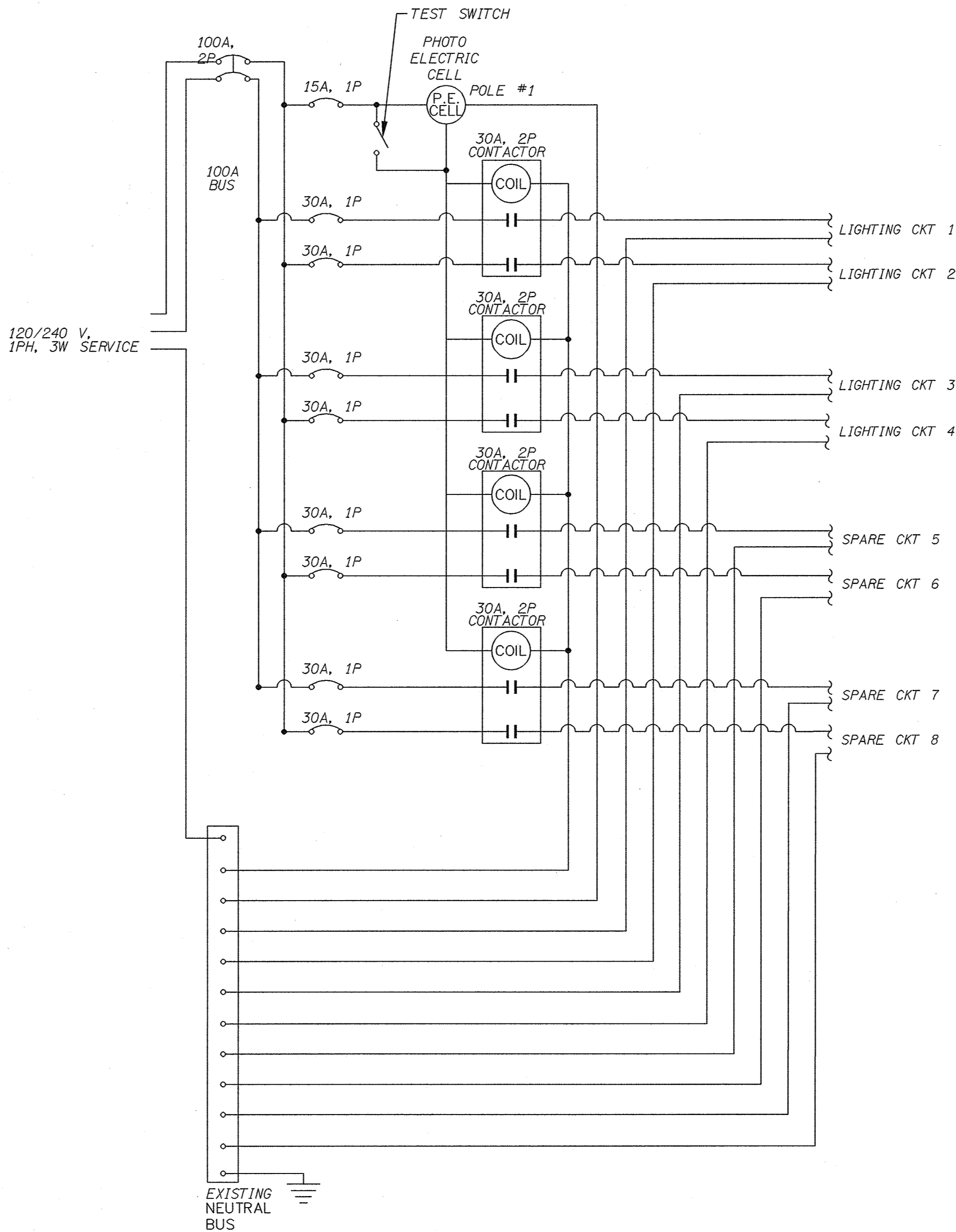
PUBLIC IMPROVEMENTS

ILLUMINATION PLAN

PBOT JOB NO.
TH0457
SHEET NO.
IL-1
26 OF 28

STREET LIGHTING NOTES

- ALL STREET LIGHTING WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE 2010 CITY OF PORTLAND CONSTRUCTION SPECIFICATIONS EXCEPT AS NOTED ON THESE PLANS OR IN THE PROJECT SPECIAL PROVISIONS.
- CONTRACTOR SHALL CONTACT LISA OKIMOTO, C.O.P. STREET LIGHTING DESIGN (503-823-5611) PRIOR TO CONSTRUCTION FOR INFORMATION CONCERNING MATERIAL SUBMITTALS, INSTALLATION OF BURIED MATERIALS SUCH AS STREET LIGHT CONDUITS, AND POLE SERVICE CONNECTION.
- CONTRACTOR TO CONTACT C.O.P. STREET LIGHTING INSPECTOR (503-823-8889 CELL) 2 BUSINESS DAYS PRIOR TO STARTING ANY STREET LIGHTING WORK AND PRIOR TO CONCEALING ANY MATERIALS THAT WILL BE BURIED IN SOIL, CONCRETE, OR CDF.
- PROVIDE ONE POLYESTER PULL TAPE RATED AT 1250 LBS, AND ONE ADDITIONAL YELLOW #12 AWG WIRE IN ALL CONDUITS. THIS CONDUCTOR WILL BE USED AS A "TRACER" WIRE FOR FUTURE LOCATING OF THE UNDERGROUND SYSTEM.
- CONTRACTOR IS RESPONSIBLE FOR FURNISHING AND INSTALLING ALL LIGHTING MATERIALS EXCEPT AS NOTED ON PLANS.
- CONTRACTOR SHALL BE RESPONSIBLE FOR ALL COORDINATION WITH UTILITY COMPANY AND ASSOCIATED COSTS. CONTACT PGE SERVICE COORDINATORS (503-328-6700) FOR SERVICE CONNECTION WHEN SYSTEM HAS BEEN INSTALLED AND INSPECTED PGE WORK ORDER NO. M2448485.
- CONTRACTOR SHALL OBTAIN AN ELECTRICAL PERMIT FROM THE BUREAU OF DEVELOPMENT SERVICES.
- EXISTING STREET LIGHT CONDUIT LOCATION IS APPROXIMATE, EXACT LOCATION SHALL BE FIELD VERIFIED PRIOR TO START OF WORK.
- CONTRACTOR IS RESPONSIBLE FOR MAINTAINING ADEQUATE LIGHTING OF WORK ZONE AREA.
- CITY RESERVES THE RIGHT TO REQUIRE THE CONTRACTOR TO PROVIDE ADDITIONAL TEMPORARY LIGHTING IF ADDITIONAL LIGHTING IS DETERMINED TO BE NECESSARY TO ADEQUATELY ILLUMINATE THE WORK ZONE AREA, OR ADDITIONAL AREAS IN WHICH LIGHTING HAS BEEN AFFECTED BY THE WORK ZONE AREA.
- THE STREET LIGHT POLE SHALL BE A BOTTLE NECK TYPE POLE PER C.O.P. STD. DWG. P-653-B. THE LUMINAIRE SHALL BE LUMEC Z-15-65W42LED4K-R-AC-RLE3-120-SFZ4-BKTX (BLACK). THE LAMP SHALL BE A 65W LED LAMP WITH 4000K COLOR TEMPERATURE.
- ALL STREET LIGHT POLES ARE TO BE FACTORY PRIMERED WITH WASSER FERROX-B, AND PAINTED WITH A TOP COAT OF WASSER MC-LUSTER. LIGHT POLES SHALL BE PAINTED HISTORIC BLACK MC-LUSTER (W211.79).
- POURED IN PLACE FOUNDATIONS SHALL BE POURED AGAINST NATIVE EARTH CONDITIONS. IF THE FOUNDATION IS OVER EXCAVATED, THE ENTIRE AREA OF OVER EXCAVATION SHALL BE BACKFILLED WITH CONCRETE WHEN THE FOUNDATION IS POURED. CYLINDRICAL TYPE FRAMING WILL NOT BE ACCEPTED UNLESS UNSTABLE EARTH CONDITIONS REQUIRE IT, AND THEN ONLY AT THE DISCRETION OF THE ENGINEER OR INSPECTOR. WHEN CYLINDRICAL FRAMING IS REQUIRED, THE FRAMING SHALL BE CONSTRUCTED FROM A SECTION OF STEEL CULVERT OR APPROVED EQUIVALENT. NO PAPER SONOTUBE PRODUCTS WILL BE ACCEPTED FOR USE ON FOUNDATIONS FOR STREET LIGHTING PROJECTS.
- A MINIMUM 25 FT SPACING IS TO BE MAINTAINED BETWEEN STREET LIGHTS AND TREES UNLESS APPROVED OTHERWISE BY THE CITY STREET LIGHTING SECTION.
- CONTRACTOR SHALL COORDINATE WITH DESIGN CONSULTANT TO SUBMIT AS-BUILT DRAWINGS IN CADD FORMAT (DWG. OR DGN.) AND HARD COPY AT THE COMPLETION OF THE PROJECT.
- LOCATIONS OF EXISTING UTILITIES ARE APPROXIMATE. EXACT LOCATIONS SHALL BE VERIFIED PRIOR TO EXCAVATION.
- ALL STREET LIGHTING EQUIPMENT, CONDUITS AND FOUNDATIONS SHALL BE LOCATED IN THE STREET RIGHT-OF-WAY.
- ALL STREET LIGHTING WORK MUST BE PERFORMED BY A LICENSED ELECTRICAL CONTRACTOR.
- ALL LUMINAIRE GLOVE ASSEMBLIES SHALL BEAR A UL LABEL (OR OREGON APPROVED EQUIVALENT).
- SEE STANDARD DRAWINGS:
P-632: PULL BOX TYPE A & B DETAILS
P-653-B: STREET LIGHTING BOTTLE NECK TYPE LUMINAIRE POLE
P-655: STREET LIGHT PHOTOELECTRIC CONTROL ORNAMENTAL POLE DETAILS
P-660: STREET LIGHTING STANDARD STREET LIGHT STANDARD POLE FOOTING
P-671: STREET LIGHTING SERVICE CABINET DETAILS
P-680: STREET LIGHTING POLE WIRING DIAGRAM



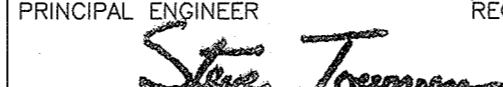


LEGEND

BOTTLENECK
XX
- NEW BOTTLENECK STREET LIGHT POLE

SCHEMATIC - TYPE "C" ROADWAY LIGHTING SERVICE PANEL

LOCATED ON THE NE CORNER OF NW 18TH AVE,
APPROX. 50 FEET SOUTH OF NW PETTY GROVE ST.

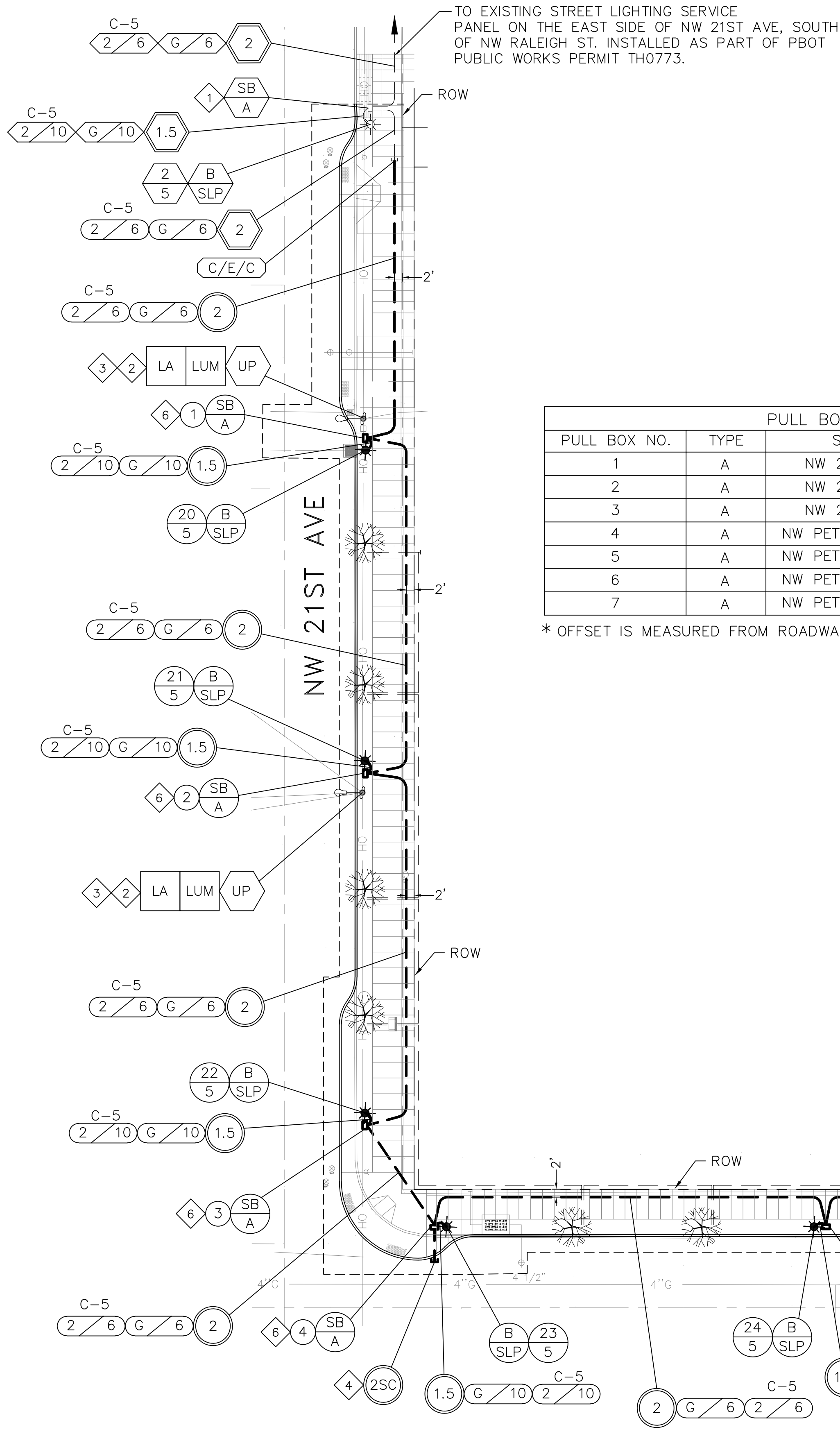
				CONSTRUCTED BY _____		DESIGNED BY JJW	DATE APPROVED		APPROVALS:		PORTLAND BUREAU OF TRANSPORTATION		NW PETTYGROVE ST, NW 17TH ST, NW OVERTON ST. & NW 18TH AVE		PBOT JOB NO. TH0457							
				PROJECT COMPLETED _____		CAD BY AAC	SECTION ENGR		 PRINCIPAL ENGINEER 11/1/18 REG. PROF. ENGR. 53382PE		CHOLE EUDALY COMMISSIONER		PUBLIC IMPROVEMENTS		SHEET NO.							
				MAP CORRECTED BY _____		CHECKED BY HJS	PBOT REVIEWER 11/1/18		 PBOT CITY ENGINEER REG. PROF. ENGR. 51538PE		STEVE TOWNSEN, P.E. CITY ENGINEER		ILLUMINATION NOTES		IL-2							
				CHECKED BY _____											27 OF 28							
NO.	DATE	DESCRIPTION		APPD.	FINAL MAP DATA																	
REVISIONS																						

- ALL STREET LIGHTING WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE 2020 CITY OF PORTLAND STANDARD SPECIFICATIONS FOR CONSTRUCTION EXCEPT AS NOTED ON THESE PLANS OR IN THE PROJECT SPECIAL PROVISIONS.
2. CONTRACTOR SHALL CONTACT NELSON CHI, CITY OF PORTLAND SIGNALS, STREET LIGHTING, AND ITS (503-823-2604) PRIOR TO CONSTRUCTION FOR INFORMATION CONCERNING MATERIAL SUBMITTALS, AND INSTALLATION OF BURIED MATERIALS SUCH AS STREET LIGHT CONDUITS.
3. CONTRACTOR SHALL CONTACT THE CITY OF PORTLAND STREET LIGHTING INSPECTOR (SSLINSPECTOR@PORTLANDOREGON.GOV) TWO WORKING DAYS PRIOR TO STARTING ANY STREET LIGHTING WORK AND PRIOR TO CONCEALING ANY MATERIALS THAT WILL BE BURIED IN SOIL, CONCRETE, OR CDF.
4. STREET LIGHTING POLES SHALL BE INSTALLED BEHIND FACE OF CURB AS INDICATED IN THE STREET LIGHT POLE SCHEDULE.
5. PROVIDE ONE POLYESTER PULL TAPE RATED AT 1250 LBS, AND ONE ADDITIONAL YELLOW #12 AWG WIRE IN ALL CONDUITS. THIS CONDUCTOR WILL BE USED AS A "TRACER" WIRE FOR FUTURE LOCATING OF THE UNDERGROUND SYSTEM.
6. CONTRACTOR IS RESPONSIBLE FOR FURNISHING AND INSTALLING ALL LIGHTING MATERIALS EXCEPT AS NOTED ON PLANS.
7. CONTRACTOR IS RESPONSIBLE FOR MAINTAINING ADEQUATE LIGHTING OF WORK ZONE AREA.
8. CITY RESERVES THE RIGHT TO REQUIRE THE CONTRACTOR TO PROVIDE ADDITIONAL TEMPORARY LIGHTING IF ADDITIONAL LIGHTING IS DETERMINED TO BE NECESSARY TO ADEQUATELY ILLUMINATE THE WORK ZONE AREA, OR ADDITIONAL AREAS IN WHICH LIGHTING HAS BEEN AFFECTED BY THE WORK ZONE AREA.
9. NEW ORNAMENTAL STREET LIGHT POLES ARE TO BE FACTORY PRIMED WITH WASSER FERROX-B AND PAINTED WITH A TOP COAT OF WASSER MC-LUSTER. BOTTLENECK LIGHT POLES SHALL BE PAINTED HISTORIC BLACK (W211.79).
10. POURED IN PLACE FOUNDATIONS SHALL BE POURED AGAINST NATIVE EARTH CONDITIONS. IF THE FOUNDATION IS OVER EXCAVATED, THE ENTIRE AREA OF OVER EXCAVATION SHALL BE BACKFILLED WITH CONCRETE WHEN THE FOUNDATION IS POURED. CYLINDRICAL TYPE FRAMING WILL NOT BE ACCEPTED UNLESS UNSTABLE EARTH CONDITIONS REQUIRE IT, AND THEN ONLY AT THE DISCRETION OF THE ENGINEER OR INSPECTOR. WHEN CYLINDRICAL FRAMING IS REQUIRED, THE FRAMING SHALL BE CONSTRUCTED FROM A SECTION OF STEEL CULVERT OR APPROVED EQUIVALENT. NO PAPER SONOTUBE PRODUCTS WILL BE ACCEPTED FOR USE ON FOUNDATIONS FOR STREET LIGHTING PROJECTS.
11. A MINIMUM OF 25 FT SPACING IS TO BE MAINTAINED BETWEEN STREET LIGHTS AND TREES UNLESS APPROVED OTHERWISE BY THE CITY STREET LIGHTING SECTION.
12. CONTRACTOR MUST SUPPLY AS-BUILT DRAWINGS IN CAD FORMAT (.DWG OR .DGN) AND HARD COPY AT THE COMPLETION OF THE PROJECT.
13. LOCATION OF THE EXISTING UTILITIES ARE APPROXIMATE. EXACT LOCATIONS SHALL BE VERIFIED PRIOR TO EXCAVATION.
14. ALL STREET LIGHTING EQUIPMENT, CONDUITS AND FOUNDATIONS SHALL BE LOCATED IN THE STREET RIGHT-OF-WAY.
15. ALL STREET LIGHTING WORK MUST BE PERFORMED BY A LICENSED ELECTRICAL CONTRACTOR.
16. JUNCTION BOXES INSTALLED OUTSIDE OF PORTLAND CEMENT CONCRETE SIDEWALKS SHALL HAVE A 1-FT (12-IN) PORTLAND CEMENT CONCRETE APRON PER STANDARD DRAWING P-632 PULL BOX TYPE A & B DETAILS.
17. SEE STANDARD DRAWINGS:
 - P-632: PULL BOX TYPE A & B DETAILS
 - P-653-B: BOTTLENECK TYPE LUMINAIRE POLE
 - P-660: STREET LIGHTING STANDARD STREET LIGHT STANDARD POLE FOOTING
 - P-680: STREET LIGHTING POLE WIRING DIAGRAMS



FILE: W:\2016\P16-014-000 (PORTLAND BLOCK 290)\ACAD\IL-01.DWG # IL-01 1/10/2022 7:23:31 AM - DANAB

FILE: W:\2016\16-014-000 (PORTLAND BLOCK 290)\ACAD\IL-02.DWG IL-02 1/10/2022 7:23:37 AM - DANAB



NEW STREET LIGHT POLE SCHEDULE								
POLE NO.	CIRCUIT NO.	STREET	STATION	OFFSET *	POLE TYPE	LUMINAIRE		
						LUMINAIRE ARM	MOUNTING HEIGHT	MODEL/NUMBER
20	5	NW 21ST AVE	12+23.0 RT	20.5	BOTTLENECK	N/A	14' (SEE STD. DWG. P-653-B)	CL32-R-J-L-A-2-A-W-N-W-A-3-S-SP1
21	5	NW 21ST AVE	11+34.0 RT	20.5	BOTTLENECK	N/A	14' (SEE STD. DWG. P-653-B)	CL32-R-J-L-A-2-A-W-N-W-A-3-S-SP1
22	5	NW 21ST AVE	10+49.6 RT	20.5	BOTTLENECK	N/A	14' (SEE STD. DWG. P-653-B)	CL32-R-J-L-A-2-A-W-N-W-A-3-S-SP1
23	5	NW PETTYGROVE ST	1+41.3 LT	20.5	BOTTLENECK	N/A	14' (SEE STD. DWG. P-653-B)	CL32-R-J-L-A-2-A-W-N-W-A-3-S-SP1
24	5	NW PETTYGROVE ST	2+34.8 LT	20.5	BOTTLENECK	N/A	14' (SEE STD. DWG. P-653-B)	CL32-R-J-L-A-2-A-W-N-W-A-3-S-SP1
25	5	NW PETTYGROVE ST	3+18.1 LT	20.5	BOTTLENECK	N/A	14' (SEE STD. DWG. P-653-B)	CL32-R-J-L-A-2-A-W-N-W-A-3-S-SP1

*OFFSET IS MEASURED FROM CENTERLINE OF ROADWAY TO CENTER OF POLE.

PULL BOX SCHEDULE				
PULL BOX NO.	TYPE	STREET	STATION	OFFSET
1	A	NW 21ST AVE	12+21.0	2.5'
2	A	NW 21ST AVE	11+35.9	2.5'
3	A	NW 21ST AVE	10+46.8	6.5'
4	A	NW PETTYGROVE ST	1+37.9	20.5'*
5	A	NW PETTYGROVE ST	2+37.8	2.5'
6	A	NW PETTYGROVE ST	3+14.3	2.5'
7	A	NW PETTYGROVE ST	3+95.0	2.5'

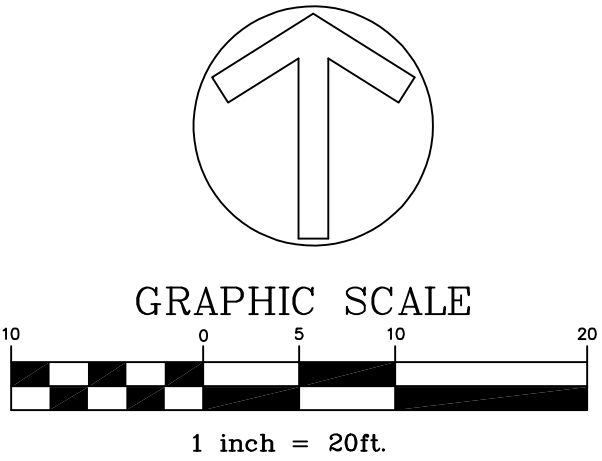
* OFFSET IS MEASURED FROM ROADWAY CENTERLINE TO CENTER OF JUNCTION BOX.

CONSTRUCTION NOTES:

- SPlice new conductors to existing conductors in sidewalk pull box.
- EXISTING UTILITY POLE MOUNTED LUMINAIRE TO REMAIN OPERATIONAL UNTIL NEW LIGHTING IS INSTALLED AND OPERATIONAL.
- CONTACT CITY OF PORTLAND SIGNALS AND STREET LIGHTING MAINTENANCE, EFRAIN ROBLES (503-823-6755) TWO WORKING DAYS IN ADVANCE TO COORDINATE DROP OFF OF SALVAGED LUMINAIRE ARM AND LUMINAIRE.
- INSTALL STUB-OUT CONDUIT 18 INCHES PAST FACE OF CURB.
- CONDUIT FOR FUTURE USE.
- JUNCTION BOXES INSTALLED OUTSIDE OF PORTLAND CEMENT CONCRETE SIDEWALKS SHALL HAVE A 1-FT (12-IN) PORTLAND CEMENT CONCRETE APRON PER STANDARD DRAWING P-632 PULL BOX TYPE A & B DETAILS.

LEGEND

- C/E/C — CUT EXISTING CONDUIT AND SPLICE TO NEW CONDUIT.
- UP — EXISTING WOOD UTILITY POLE.
- LUM — REMOVE EXISTING LUMINAIRE.
- LA — REMOVE EXISTING LUMINAIRE ARM.
- (S) — EXISTING (S) INCH CONDUIT.
- B SLP — EXISTING BOTTLENECK STREET LIGHT POLE.
- SB (T) — EXISTING TYPE (T) SIDEWALK PULL BOX.
- (S) (A) — EXISTING STREET LIGHT POLE NUMBERS (S) CONNECTED TO LIGHTING CIRCUIT (A).
- (S) (A) — NEW STREET LIGHT POLE NUMBER (S) CONNECTED TO LIGHTING CIRCUIT (A).
- B SLP — INSTALL BOTTLENECK STREET LIGHT POLE ON NEW FOUNDATION.
- SB (T) — INSTALL NEW TYPE (T) SIDEWALK PULL BOX.
- (N) — PULL BOX NO. (N). SEE PULL BOX SCHEDULE THIS SHEET.
- (S) — INSTALL (S) INCH CONDUIT.
- (S) SC — INSTALL (S) INCH DIAMETER CONDUIT STUB FOR FUTURE USE (CAP ENDS).
- (N) (G) — EXISTING ONE (G) AWG GROUNDWIRE.
- C-(A) (N) (G) — EXISTING (N)-NO. (G) AWG XHHW CIRCUIT (A) CONDUCTORS.
- G (G) — INSTALL ONE (G) AWG GROUNDWIRE.
- C-(A) (N) (G) — INSTALL (N)-NO. (G) AWG XHHW CIRCUIT (A) CONDUCTORS.
- EXISTING UTILITY POLE MOUNTED COBRA HEAD STREET LIGHT
- PROPOSED BOTTLENECK STREET LIGHT POLE
- PROPOSED SIDEWALK PULL BOX
- EXISTING STREET LIGHT CONDUIT
- PROPOSED STREET LIGHT CONDUIT



				CONSTRUCTED BY _____
				PROJECT COMPLETED _____
				MAP CORRECTED BY _____
				CHECKED BY _____
NO.	DATE	DESCRIPTION	APPD.	FINAL MAP DATA
				REVISIONS

DESIGNED BY SBA	DATE APPROVED
CAD BY GTE CAD	DIV. ENGINEER
CHECKED BY DMB	PBOT REVIEWER



APPROVALS:

PBOT PRINCIPAL ENGINEER	REG. PROF. ENGR. 53882PE
PBOT CITY ENGINEER	REG. PROF. ENGR. 51538PE

PORTLAND BUREAU OF TRANSPORTATION

JOANNE HARDESTY	COMMISSIONER
STEVE TOWNSEN, P.E.	CITY ENGINEER

FRONTAGE IMPROVEMENT FOR NW 21ST AVENUE AND NW PETTYGROVE STREET ILLUMINATION PLAN

PBOT JOB NO. TH0350
SHEET NO. IL-02 13 OF 13

GENERAL NOTES

1. ALL STREET LIGHTING SHALL BE PERFORMED IN ACCORDANCE WITH THE 2010 CITY OF PORTLAND STANDARD SPECIFICATIONS FOR CONSTRUCTION EXCEPT AS NOTED ON THESE PLANS OR IN THE PROJECT SPECIAL PROVISIONS.
2. CONTRACTOR SHALL CONTACT NELSON CHI, C.O.P. STREET LIGHTING DESIGN (503) 823-4111 PRIOR TO CONSTRUCTION FOR INFORMATION CONCERNING MATERIAL SUBMITTALS AND INSTALLATION OF BURIED MATERIALS SUCH AS STREET LIGHT CONDUITS.
3. CONTRACTOR IS RESPONSIBLE FOR CONTACTING DALE KURKINEN, CITY OF PORTLAND STREET LIGHTING INSPECTOR (503) 823-5217, OFFICE, (503) 823-8889, CELL, 48 HOURS PRIOR TO STARTING ANY WORK ON STREET LIGHTING AND PRIOR TO CONCEALING ANY MATERIALS THAT WILL BE BURIED IN SOIL OR CONCRETE.
4. CONTRACTOR IS RESPONSIBLE FOR FURNISHING AND INSTALLING ALL LIGHTING MATERIAL EXCEPT AS NOTED ON PLANS.
5. PROVIDE ONE POLYESTER PULL TAPE RATED AT 1,250 LBS. AND ONE ADDITIONAL YELLOW #12 AWG WIRE IN ALL CONDUITS. THIS CONDUCTOR WILL BE USED AS A "TRACER" WIRE FOR FUTURE LOCATING OF THE UNDERGROUND SYSTEM.
6. CONTRACTOR SHALL OBTAIN AN ELECTRICAL PERMIT FROM THE BUREAU OF DEVELOPMENT SERVICES.
7. CONTRACTOR SHALL BE RESPONSIBLE FOR COST TO REPAIR OR REPLACE ANY EXISTING STREET LIGHTING EQUIPMENT LOST OR DAMAGED AS A RESULT OF THIS PROJECT.
8. EXISTING STREET LIGHT CONDUIT LOCATIONS SHALL BE FIELD VERIFIED PRIOR TO THE START OF WORK.
9. CONTRACTOR IS RESPONSIBLE FOR MAINTAINING ADEQUATE LIGHTING OF WORK ZONE AREA.
10. CITY RESERVES THE RIGHT TO REQUIRE THE CONTRACTOR TO PROVIDE ADDITIONAL TEMPORARY LIGHTING IF ADDITIONAL LIGHTING IS DETERMINED TO BE NECESSARY TO ADEQUATELY ILLUMINATE THE WORK ZONE AREA, OR ADDITIONAL AREAS IN WHICH LIGHTING HAS BEEN AFFECTED BY THE WORK ZONE AREA.
11. POURED IN PLACE FOUNDATIONS SHALL BE POURED AGAINST NATIVE EARTH CONDITIONS. IF THE FOUNDATION IS TO BE OVER EXCAVATED, THE ENTIRE AREA OVER EXCAVATION SHALL BE BACKFILLED WITH CONCRETE WHEN THE FOUNDATION IS POURED. CYLINDRICAL TYPE FRAMING WILL NOT BE ACCEPTED UNLESS UNSTABLE EARTH CONDITIONS REQUIRE IT, AND THEN ONLY AT THE DISCRETION OF THE ENGINEER OR INSPECTOR. WHEN CYLINDRICAL FRAMING IS REQUIRED, THE FRAMING SHALL BE CONSTRUCTED FROM A SECTION OF STEEL CULVERT OR APPROVED EQUIVALENT, NO PAPER SONOTUBE PRODUCTS WILL BE ACCEPTED FOR USE ON FOUNDATIONS FOR STREET LIGHTING PROJECTS.
12. LOCATIONS OF EXISTING UTILITIES ARE APPROXIMATE. EXACT LOCATIONS TO BE FIELD VERIFIED PRIOR TO EXCAVATION.
13. ALL NEW TWIN, AND SINGLE ORNAMENTAL POLES ARE TO BE FACTORY PRIMERED WITH WASSER FERROX B. SINGLE AND TWIN ORNAMENTAL POLES SHALL BE FIELD TOP COATED WITH WASSER MC-LUSTER PORTLAND GREEN (W21.0227) AND TRIMMED WITH GOLD (W21.0226). COBRA POLES SHALL BE FIELD TOP COATED WITH WASSER MC-LUSTER HISTORIC BLACK BLACK (W21.79).
14. THE FOLLOWING CITY OF PORTLAND STANDARD DETAILS APPLY TO THIS PROJECT.
- P-632, PULL BOX TYPE A & B DETAILS

P-652, STREET LIGHTING TWIN ORNAMENTAL POLE DETAILS

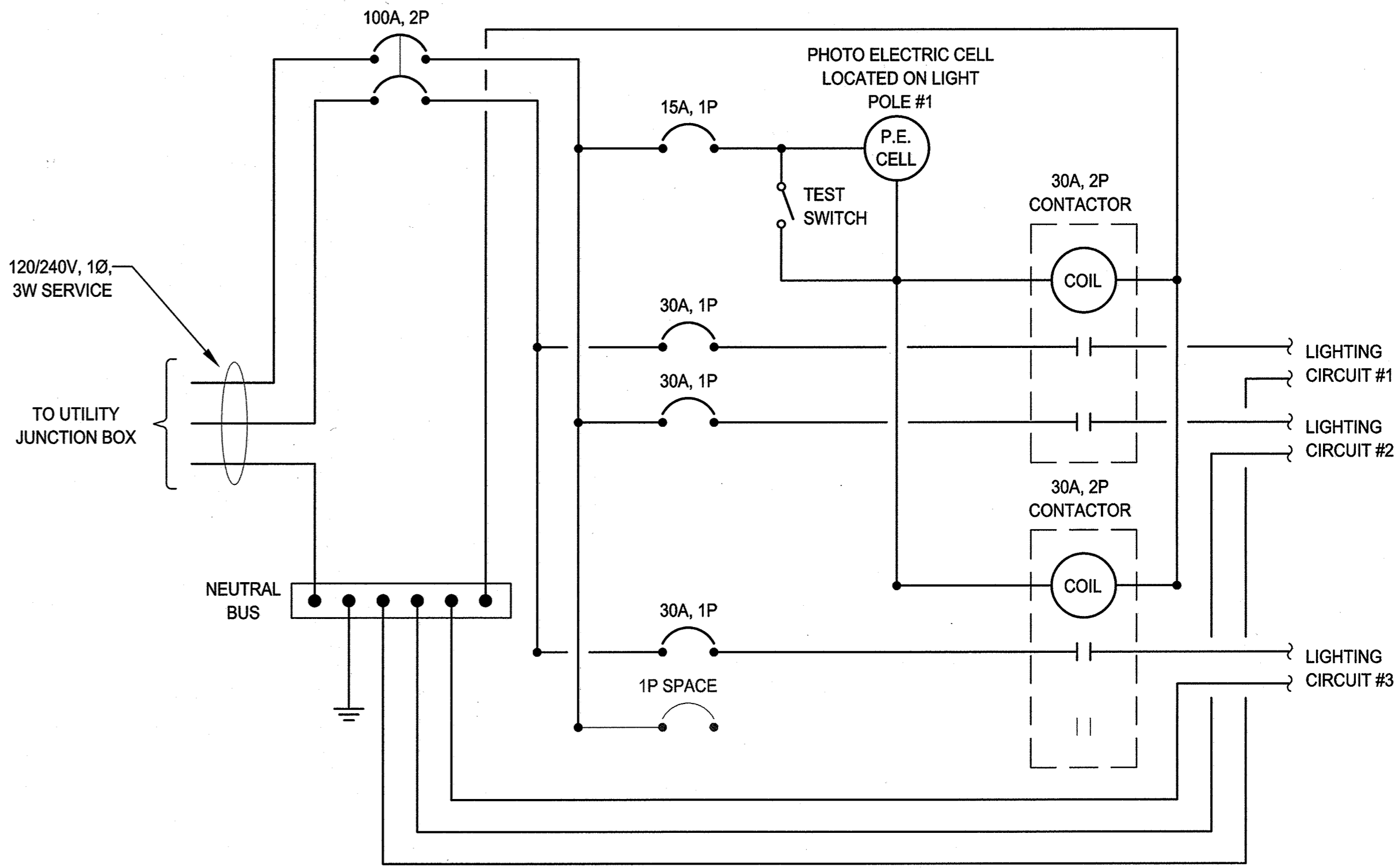
P-653A, STREET LIGHTING SINGLE ORNAMENTAL POLE DETAILS

P-655, STREET LIGHTING PHOTOELECTRIC CONTROL / ORNAMENTAL POLE DETAILS

P-660, STREET LIGHTING STANDARD STREET LIGHT STANDARD POLE FOOTING

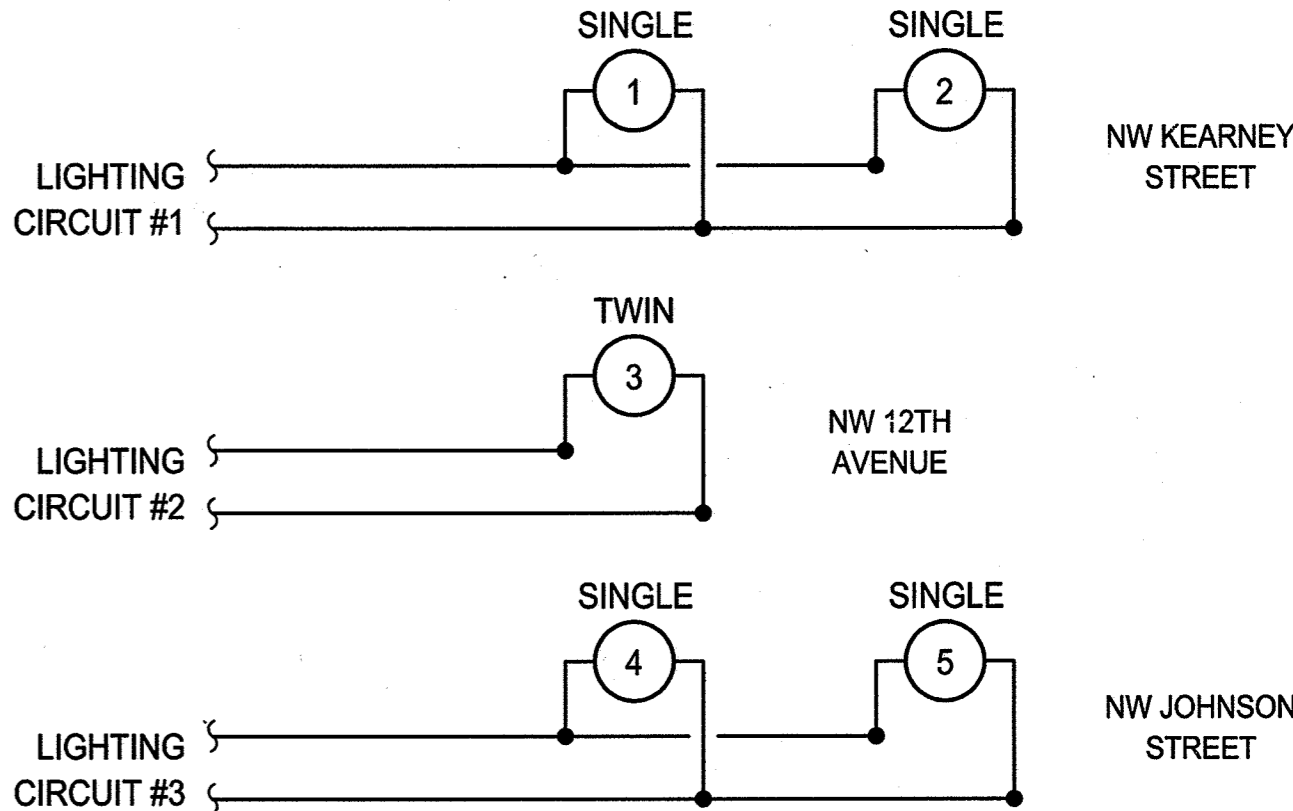
P-671, STREET LIGHTING SERVICE CABINET DETAILS

P-680, STREET LIGHTING POLE WIRING DIAGRAMS
15. A MINIMUM OF 25' SPACING IS TO BE MAINTAINED BETWEEN STREET LIGHTS AND TREES UNLESS APPROVED OTHERWISE BY THE CITY STREET LIGHTING SECTION.
16. STREET LIGHTING POLES SHALL BE INSTALLED AT MINIMUM, 30" BEHIND FACE OF CURB, EXCEPT AS SHOWN OTHERWISE ON PLANS.
17. ALL STREET LIGHTING EQUIPMENT, CONDUIT, AND FOUNDATIONS SHALL BE LOCATED IN THE PUBLIC RIGHT-OF-WAY.
18. POLE RECONDITIONING AND REPAINTING SHALL BE PERFORMED ACCORDING TO STANDARD CONSTRUCTION SPECIFICATIONS AND SPECIAL PROVISIONS PROVIDED BY THE CITY STREET LIGHTING SECTION. CONTACT NELSON CHI, COP (503) 823-2604 WITH ANY QUESTIONS.
19. THE COBRA HEAD LUMINAIRES ON NW 13TH AVENUE SHALL BE LEOTEK ECOBRA EC3-10M-NW-3-GY-530 OR APPROVED EQUAL.



A
1L1

PANEL SCHEMATIC - STREET LIGHTING PANEL TYPE C
LOCATED AT THE SOUTH SIDE OF NW KEARNEY STREET
APPROXIMATELY 80' EAST OF NW 13TH AVENUE




LEGEND

- TWIN
XX = TWIN ORNAMENTAL STREET POLE
- SINGLE
XX = SINGLE ORNAMENTAL STREET POLE

VOLTAGE DROP CALCULATIONS								
FROM	TO	FEEDER	FEEDER LENGTH	LOAD (VA)	VOLTAGE/ PHASE	PERCENT VOLTAGE DROP	MAX. ALLOWED PER PBOT	NET VOLTAGE
PANEL	PULL BOX @ 1/1	(6) #6 XHHW CU.	10	52	120V, 1Ø	0.01	3%	119.88
PULL BOX @ 1/1	PULL BOX @ 2/1	(6) #6 XHHW CU.	125	52	120V, 1Ø	0.04	3%	119.40
PULL BOX @ 2/1	PULL BOX @ 3/2	(4) #6 XHHW CU.	185	104	120V, 1Ø	0.20	3%	119.76
PULL BOX @ 3/2	PULL BOX @ 4/3	(2) #6 XHHW CU.	460	52	120V, 1Ø	0.33	3%	119.6
PULL BOX @ 4/3	PULL BOX @ 5/3	(2) #6 XHHW CU.	150	52	120V, 1Ø	0.05	3%	119.01

FILE: BLOCK 136 PBOT ELECTRICAL PLANS.DWG 1L1 8/3/2016 2:02:27 PM - TOM CARRIGAN

NO.		DATE	DESCRIPTION	APPD.	DESIGNED BY TRC		DATE APPROVED		APPROVALS:		PORTLAND BUREAU OF TRANSPORTATION				PUBLIC IMPROVEMENTS NW JOHNSON ST, NW 13TH AVE, NW 12TH AVE, NW KEARNEY ST (BLOCK 136 MIXED USE) PBOT NOTES, POWER DISTRIBUTION, AND VOLTAGE DROPS		PBOT JOB NO. TH0134		
					CAD BY TRC		SECTION ENGR		PROJECT PRINCIPAL ENGINEER 9/6/16 REG. PROF. ENGR. 53882PE		STEVE NOVICK COMMISSIONER						SHEET NO. IL1		
					CHECKED BY MES		PBOT REVIEWER		PBOT CITY ENGINEER REG. PROF. ENGR. 51538PE		STEVE TOWNSEN, P.E. CITY ENGINEER						14 OF 18		
REVISIONS					FINAL MAP DATA														

9/6/16 - RUC

CONSTRUCTION NOTES

1 2 INCH STUBOUT CONDUIT TO BE INSTALLED 18 INCHES PAST THE FACE OF CURB.

LEGEND

- (S)

INSTALL (S) INCH DIAMETER SCH 80 PVC CONDUIT
- 2SC

2" CONDUIT STUBOUT MINIMUM 18" FROM FACE OF CURB
- T
SLP

INSTALL TWIN ORNAMENTAL STREET LIGHT POLE
- S
SLP

INSTALL SINGLE ORNAMENTAL STREET LIGHT POLE
- SB
(S)

INSTALL TYPE (S) SIDEWALK PULL BOX
- (S)
(T)

(S) = LIGHT POLE NUMBER AND (T) = LIGHTING CIRCUIT
- (S)
(X)
C - (A)
(N) / (G)

INSTALL (S) INCH DIAMETER SCH 80 PVC CONDUIT

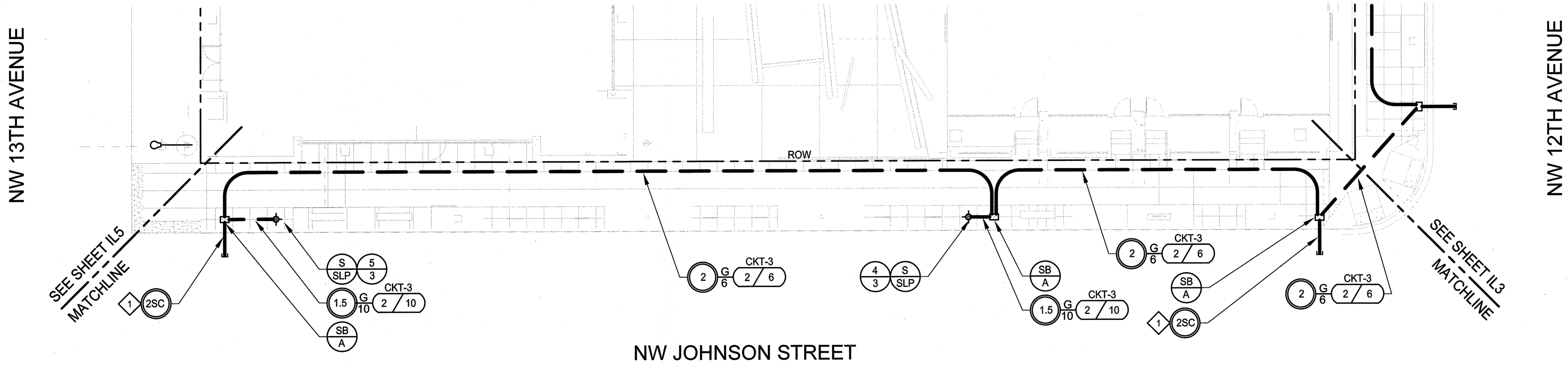
ONE (X) AWG GROUND WIRE
(N)-NO.(G) AWG XHHW WIRE

CIRCUIT (A) CONDUCTORS
- COBRA HEAD STREET LIGHT
- TWIN ORNAMENTAL STREET LIGHT
- SINGLE ORNAMENTAL STREET LIGHT
- RIGHT-OF-WAY, (ROW)
- PULL BOX
- STREET LIGHT PANEL
- PGE/PACIFIC POWER VAULT

STREET LIGHT POLE SCHEDULE

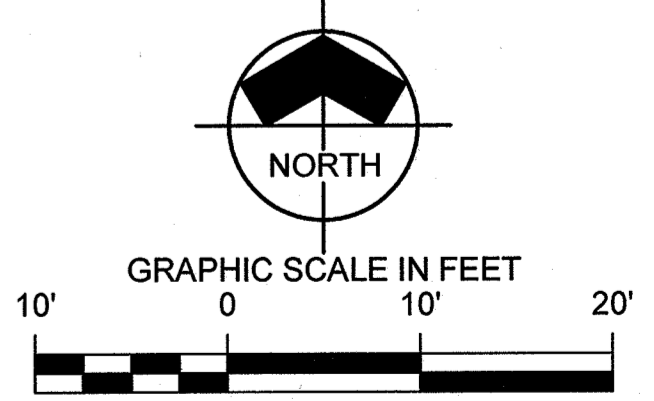
POLE NUMBER	CIRCUIT # & PANEL	STREET	STATION	OFFSET (FEET)*	NOTES
1	1	NW KEARNEY STREET	21+00.77	2.5	SINGLE ORNAMENTAL POLE (IL4)
2	1	NW KEARNEY STREET	22+20.79	2.5	SINGLE ORNAMENTAL POLE (IL4)
3	2	NW 12TH AVENUE	41+30.02	2.5	TWIN ORNAMENTAL POLE (IL3)
4	3	NW JOHNSON STREET	11+63.01	2.5	SINGLE ORNAMENTAL POLE (IL2)
5	3	NW JOHNSON STREET	10+43.01	2.5	SINGLE ORNAMENTAL POLE (IL2)
1	1A	NW 13TH AVENUE	30+33.10	27.56**	EXISTING COBRA HEAD (IL5)
3	1A	NW 13TH AVENUE	32+29.95	27.57**	EXISTING COBRA HEAD (IL5)

* OFFSET IS MEASUREMENT FROM FACE OF CURB TO CENTER OF POLE
** OFFSET IS MEASUREMENT FROM CENTER OF ROADWAY TO CENTER OF POLE



NW JOHNSON STREET

A STREET LIGHTING PLAN - NW JOHNSON STREET
IL2 SCALE: 1"=10'-0"



FILE: BLOCK 136 PBOT ELECTRICAL PLANS.DWG 1L2 8/3/2016 2:02:31 PM -- TOM.CARRIGAN

<div>NO. DATE DESCRIPTION APPD.</div>		<div>DESIGNED BY TRC DATE APPROVED</div>			APPROVALS:		PORTLAND BUREAU OF TRANSPORTATION		PUBLIC IMPROVEMENTS		PBOT JOB NO.	
<div>CONSTRUCTED BY</div>		<div>CAD BY TRC SECTION ENGR</div>			<div>PROJECT COMPLETED</div>		<div>STEVE NOVICK COMMISSIONER</div>		<div>NW JOHNSON ST, NW 13TH AVE, NW 12TH AVE, NW KEARNEY ST (BLOCK 136 MIXED USE)</div>		<div>TH0134</div>	
<div>MAP CORRECTED BY</div>		<div>CHECKED BY MES PBOT REVIEWER</div>			<div>STEVE TOWNSEN P.E. CITY ENGINEER</div>		<div>STREET LIGHTING PLAN NW JOHNSON STREET</div>		<div>SHEET NO.</div>		<div>IL2</div>	
<div>CHECKED BY</div>		<div>FINAL MAP DATA</div>			<div>7/4/16-Rec</div>		<div>15 OF 18</div>					

CONSTRUCTION NOTES

1 2 INCH STUBOUT CONDUIT TO BE INSTALLED 18 INCHES PAST THE FACE OF CURB.

LEGEND

- (S)

INSTALL (S) INCH DIAMETER SCH 80 PVC CONDUIT
- 2SC

2" CONDUIT STUBOUT MINIMUM 18" FROM FACE OF CURB
- T
SLP

INSTALL TWIN ORNAMENTAL STREET LIGHT POLE
- S
SLP

INSTALL SINGLE ORNAMENTAL STREET LIGHT POLE
- SB
(S)

INSTALL TYPE (S) SIDEWALK PULL BOX
- (S)
(T)

(S) = LIGHT POLE NUMBER AND (T) = LIGHTING CIRCUIT
- (S)
(X)
C-(A)
(N)/(G)

INSTALL (S) INCH DIAMETER SCH 80 PVC CONDUIT

ONE (X) AWG GROUND WIRE
(N)-NO.(G) AWG XHHW WIRE

CIRCUIT (A) CONDUCTORS
- COBRA HEAD STREET LIGHT

PULL BOX
- TWIN ORNAMENTAL STREET LIGHT

STREET LIGHT PANEL
- SINGLE ORNAMENTAL STREET LIGHT

PGE/PACIFIC POWER VAULT
- RIGHT-OF-WAY, (ROW)

STREET LIGHT POLE SCHEDULE					
POLE NUMBER	CIRCUIT # & PANEL	STREET	STATION	OFFSET (FEET)*	NOTES
1	1	NW KEARNEY STREET	21+00.77	2.5	SINGLE ORNAMENTAL POLE (IL4)
2	1	NW KEARNEY STREET	22+20.79	2.5	SINGLE ORNAMENTAL POLE (IL4)
3	2	NW 12TH AVENUE	41+30.02	2.5	TWIN ORNAMENTAL POLE (IL3)
4	3	NW JOHNSON STREET	11+63.01	2.5	SINGLE ORNAMENTAL POLE (IL2)
5	3	NW JOHNSON STREET	10+43.01	2.5	SINGLE ORNAMENTAL POLE (IL2)
1	1A	NW 13TH AVENUE	30+33.10	27.56**	EXISTING COBRA HEAD (IL5)
3	1A	NW 13TH AVENUE	32+29.95	27.57**	EXISTING COBRA HEAD (IL5)

* OFFSET IS MEASUREMENT FROM FACE OF CURB TO CENTER OF POLE
** OFFSET IS MEASUREMENT FROM CENTER OF ROADWAY TO CENTER OF POLE

NW JOHNSON STREET

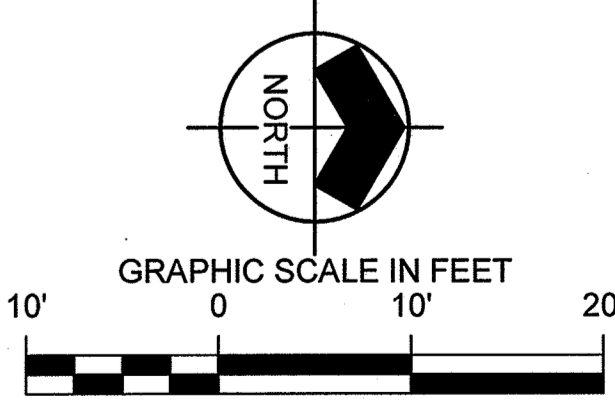
NW KEARNEY STREET

SEE SHEET IL2
MATCHLINE

SEE SHEET IL4
MATCHLINE

NW 12TH AVENUE

A STREET LIGHTING PLAN - NW 12TH AVENUE
IL3 SCALE: 1"=10'-0"



FILE: BLOCK 136 PBOT ELECTRICAL PLANS.DWG 1L3 8/3/2016 2:02:34 PM - TOM CARRIGAN

		CONSTRUCTED BY _____		DESIGNED BY	DATE APPROVED
		PROJECT COMPLETED _____		CAD BY	SECTION ENGR
		MAP CORRECTED BY _____		CHECKED BY	PBOT REVIEWER
		CHECKED BY _____			
NO.	DATE	DESCRIPTION	APPD.		
REVISIONS				FINAL MAP DATA	



APPROVALS:
Principal Engineer: *[Signature]* 9/7/16
City Engineer: *[Signature]*
REG. PROF. ENGR. 53882PE
REG. PROF. ENGR. 51538PE

PORTLAND
BUREAU OF TRANSPORTATION

STEVE NOVICK COMMISSIONER
STEVE TOWNSEN, P.E. CITY ENGINEER

PUBLIC IMPROVEMENTS
NW JOHNSON ST, NW 13TH AVE,
NW 12TH AVE, NW KEARNEY ST
(BLOCK 136 MIXED USE)

STREET LIGHTING PLAN
NW 12TH AVENUE

PBOT JOB NO.
TH0134
SHEET NO.
IL3
16 OF 18

9/6/16-RC

CONSTRUCTION NOTES

- 1
- 2
- 2 INCH STUBOUT CONDUIT TO BE INSTALLED 18 INCHES PAST THE FACE OF CURB.
- CONTRACTOR IS REQUIRED TO COORDINATE WITH DAVE McNEEL WITH PGE 503-742-8402 REGARDING SERVICE CONNECTION REQUIREMENTS.

LEGEND

- (S)

INSTALL (S) INCH DIAMETER SCH 80 PVC CONDUIT
- (2SC)

2" CONDUIT STUBOUT MINIMUM 18" FROM FACE OF CURB
- PE

INSTALL PHOTOELECTRIC RELAY
- PS MH

INSTALL POWER SOURCE IN MANHOLE
- T SLP

INSTALL TWIN ORNAMENTAL STREET LIGHT POLE
- S SLP

INSTALL SINGLE ORNAMENTAL STREET LIGHT POLE
- SB (S)

INSTALL TYPE (S) SIDEWALK PULL BOX
- PAN (S)

INSTALL PANEL (S) TYPE, POLE MOUNTED
- (S) (T)

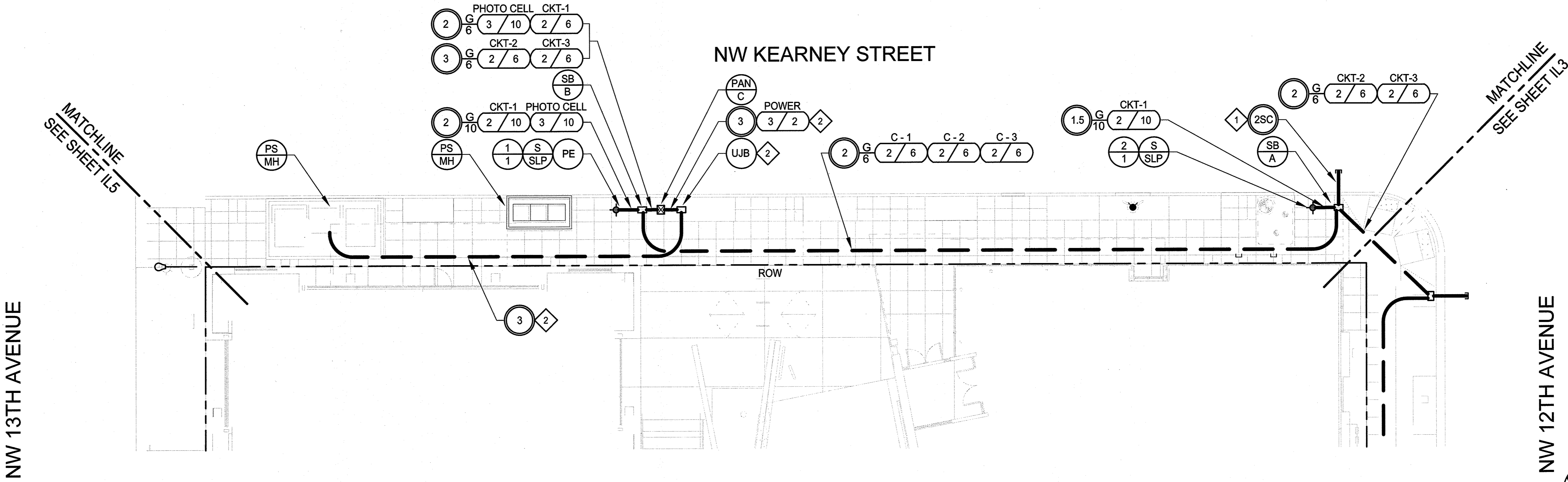
(S) = LIGHT POLE NUMBER AND (T) = LIGHTING CIRCUIT
- (S) (X) (N) (G) C - (A)

INSTALL (S) INCH DIAMETER SCH 80 PVC CONDUIT
- ONE (X) AWG GROUND WIRE
- (N)-NO.(G) AWG XHHW WIRE
- CIRCUIT (A) CONDUCTORS
- UJB


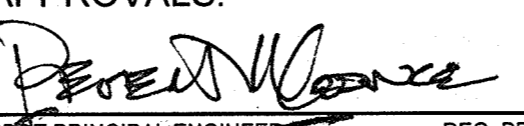
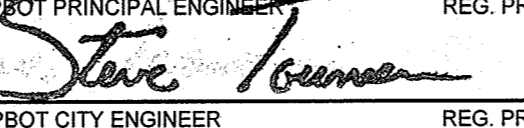
INSTALL UTILITY JUNCTION BOX LID TO BE LABELED WITH "ELECTRIC"
- COBRA HEAD STREET LIGHT
- TWIN ORNAMENTAL STREET LIGHT
- SINGLE ORNAMENTAL STREET LIGHT
- PULL BOX
- STREET LIGHT PANEL
- PGE/PACIFIC POWER VAULT
- RIGHT-OF-WAY, (ROW)

STREET LIGHT POLE SCHEDULE					
POLE NUMBER	CIRCUIT # & PANEL	STREET	STATION	OFFSET (FEET)*	NOTES
1	1	NW KEARNEY STREET	21+00.77	2.5	SINGLE ORNAMENTAL POLE (IL4)
2	1	NW KEARNEY STREET	22+20.79	2.5	SINGLE ORNAMENTAL POLE (IL4)
3	2	NW 12TH AVENUE	41+30.02	2.5	TWIN ORNAMENTAL POLE (IL3)
4	3	NW JOHNSON STREET	11+63.01	2.5	SINGLE ORNAMENTAL POLE (IL2)
5	3	NW JOHNSON STREET	10+43.01	2.5	SINGLE ORNAMENTAL POLE (IL2)
1	1A	NW 13TH AVENUE	30+33.10	27.56**	EXISTING COBRA HEAD (IL5)
3	1A	NW 13TH AVENUE	32+29.95	27.57**	EXISTING COBRA HEAD (IL5)

* OFFSET IS MEASUREMENT FROM FACE OF CURB TO CENTER OF POLE
** OFFSET IS MEASUREMENT FROM CENTER OF ROADWAY TO CENTER OF POLE



A
IL4
STREET LIGHTING PLAN - NW KEARNEY STREET
SCALE: 1"=10'-0"

				DESIGNED BY	DATE APPROVED		APPROVALS:  PROT PRINCIPAL ENGINEER  PROT CITY ENGINEER		PORTLAND BUREAU OF TRANSPORTATION STEVE NOVICK STEVE TOWNSEN, P.E.		PUBLIC IMPROVEMENTS NW JOHNSON ST, NW 13TH AVE, NW 12TH AVE, NW KEARNEY ST (BLOCK 136 MIXED USE) STREET LIGHTING PLAN NW KEARNEY STREET		PBOT JOB NO. TH0134
				CAD BY	SECTION ENGR								SHEET NO. IL4
				CHECKED BY	PBOT REVIEWER								17 OF 18
				CONSTRUCTED BY	DATE APPROVED								
				PROJECT COMPLETED									
				MAP CORRECTED BY									
				CHECKED BY									
										</			

CONSTRUCTION NOTES

- 3

EXISTING LIGHTS ON NW 13TH AVENUE INSTALLED UNDER PBOT JOB #58730
- 4

EXISTING STREET LIGHT POLES ON NW 13TH AVENUE SHALL BE CLEANED WITH TRISODIUM PHOSPHATE, (TSP) CLEANER, AND SHALL BE PAINTED HISTORIC BLACK - MC-LUSTER (W21.79).
- 5

EXISTING COBRA HEAD STREET LIGHT ON NW 13TH AVENUE SHALL BE RELAMPED WITH STANDARD LED. SEE GENERAL NOTES FOR SPECIFIC LED TYPE.

LEGEND

- C

SLP

EXISTING COBRAHEAD STREET LIGHT POLE
- (S)

(T)

(S) = LIGHT POLE NUMBER AND (T) = LIGHTING CIRCUIT
- PE

EXISTING PHOTOELECTRIC RELAY
- COBRA HEAD STREET LIGHT

TWIN ORNAMENTAL STREET LIGHT

SINGLE ORNAMENTAL STREET LIGHT

PULL BOX

STREET LIGHT PANEL

PGE/PACIFIC POWER VAULT

RIGHT-OF-WAY, (ROW)

STREET LIGHT POLE SCHEDULE					
POLE NUMBER	CIRCUIT # & PANEL	STREET	STATION	OFFSET (FEET)*	NOTES
1	1	NW KEARNEY STREET	21+00.77	2.5	SINGLE ORNAMENTAL POLE (IL4)
2	1	NW KEARNEY STREET	22+20.79	2.5	SINGLE ORNAMENTAL POLE (IL4)
3	2	NW 12TH AVENUE	41+30.02	2.5	TWIN ORNAMENTAL POLE (IL3)
4	3	NW JOHNSON STREET	11+63.01	2.5	SINGLE ORNAMENTAL POLE (IL2)
5	3	NW JOHNSON STREET	10+43.01	2.5	SINGLE ORNAMENTAL POLE (IL2)
1	1A	NW 13TH AVENUE	30+33.10	27.56**	EXISTING COBRA HEAD (IL5)
3	1A	NW 13TH AVENUE	32+29.95	27.57**	EXISTING COBRA HEAD (IL5)

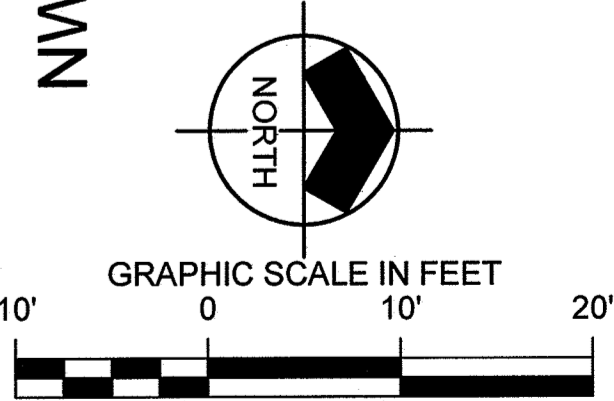
* OFFSET IS MEASUREMENT FROM FACE OF CURB TO CENTER OF POLE
** OFFSET IS MEASUREMENT FROM CENTER OF ROADWAY TO CENTER OF POLE

NW 13TH AVENUE

NW JOHNSON STREET

NW KEARNEY STREET

A
IL5
STREET LIGHTING PLAN - NW 13TH AVENUE
SCALE: 1"=10'-0"



		CONSTRUCTED BY _____		DESIGNED BY _____	DATE APPROVED _____	<div><div>APPROVALS:</div><div><div><div>Steve Novick</div><div>9/6/16</div><div>PBOT PRINCIPAL ENGINEER</div><div>REG. PROF. ENGR. 53882PE</div></div><div><div>Steve Townsend</div><div>REG. PROF. ENGR. 51538PE</div><div>PBOT CITY ENGINEER</div></div></div></div> <div><div>PORTLAND</div><div>BUREAU OF TRANSPORTATION</div><div>STEVE NOVICK</div><div>COMMISSIONER</div><div>STEVE TOWNSEN, P.E.</div><div>CITY ENGINEER</div></div>		<div><div>PUBLIC IMPROVEMENTS</div><div>NW JOHNSON ST, NW 13TH AVE,</div><div>NW 12TH AVE, NW KEARNEY ST</div><div>(BLOCK 136 MIXED USE)</div><div>STREET LIGHTING PLAN</div><div>NW 13TH AVENUE</div></div>		PBOT JOB NO.	
		PROJECT COMPLETED _____		SECTION ENGR _____						TH0134	
		MAP CORRECTED BY _____		PBOT REVIEWER _____						SHEET NO.	
		CHECKED BY _____								IL5	
NO. DATE DESCRIPTION APPD.		FINAL MAP DATA						18 OF 18			

FILE: BLOCK 136 PBOT ELECTRICAL PLANS.DWG IL5 8/3/2016 2:02:41 PM - TOM CARRIGAN